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1938

PENNSYLVANIA'S POULTRY GUIDE BOOK

1938
EDITION

THE PENNSYLVANIA
STATE POULTRY
ASSOCIATION

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IN P. S. WHITE'S
Diary of a Poultryman

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Hanover, Pennsylvania

Greetings

From the Pennsylvania State Poultry Association

MARK WITMER
President

H. C. KNANDEL
Sec.-Treas.

This Yearbook is prepared and presented to you by the Pennsylvania State Poultry Association.

In it we have tried to give you some good, practical suggestions, adaptable to the raising of poultry on the average Pennsylvania farm.

You will note that the book is carefully laid out so that the reader may start with the raising of the baby chicks and follow them through their various stages of growth in each successive chapter of the book.

Each chapter is prepared by a poultry authority whom the editorial committee considers to be an expert on the subject discussed.

That this book is presented to you free by the Pennsylvania State Poultry Association may suggest the question, "What Is The Pennsylvania State Poultry Association?"

It is the parent organization of all poultry organizations in Pennsylvania. Aside from that, it is one of the very largest poultry organizations in the country, and, we are proud to state, one of the most active.

This Association has promoted and protected the poultry interests of the Pennsylvania farmers for the past 16 years. Much of the work of the Pennsylvania State College, and the Pennsylvania Department of Agriculture has been advanced or was originated largely through the support and cooperation of this organization.

Getting away from history and down to the present, let us answer your question, "What Does It Do For Me?"

First: As a member, you get a copy of Pennsylvania Poultry News mailed to you every two months, chucked full of news of special interest to poultry growers in Pennsylvania.

Second: As a member, you get a free copy of the Yearbook; a new one is published each year.

Third: You are invited to be a guest at the Poultry Short Course in State College each October, sponsored jointly by the College and this Association and arranged to give the latest and most practical of poultry information and education in a few days time.

Fourth: You are invited to join the annual Poultry Tour, organized and conducted by the Association every August.

Fifth: You may attend the program of poultry education sponsored by the Association at the Farm Show each year.

What this Association has accomplished for the Poultry Industry by the State is too long a story to begin telling in this short space, but it sums itself up in the one brief statement: "There is no poultry grower in Pennsylvania who has not been directly or indirectly benefitted by the work of the Pennsylvania State Poultry Association."

Renew Your Membership

Now you may ask, "What Am I to Do About It?"

You are to keep up your membership in this organization which is doing so much for the industry and which also gives you such direct services as it does for your small annual membership fee of $1.00. If you haven't paid for 1938, get it in today and remember that you can pay your dues any month of the year and your membership will not expire until 12 months later. But send it in today to H. C. Knandel, 100 Hort. Building, State College, Pennsylvania. You might forget it next month.

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The Guide Book's Authors

The editorial committee of the Pennsylvania State Poultry Association thanks the authors of the various chapters contained in this 1938 edition of the Yearbook for their assistance and cooperation in presenting a guide book which we believe will be of value to all Pennsylvania poultrymen. A summary of the authors is as follows:

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1938 Edition

PENNSYLVANIA'S POULTRY GUIDE BOOK

Price $1.00 (Free to Members)

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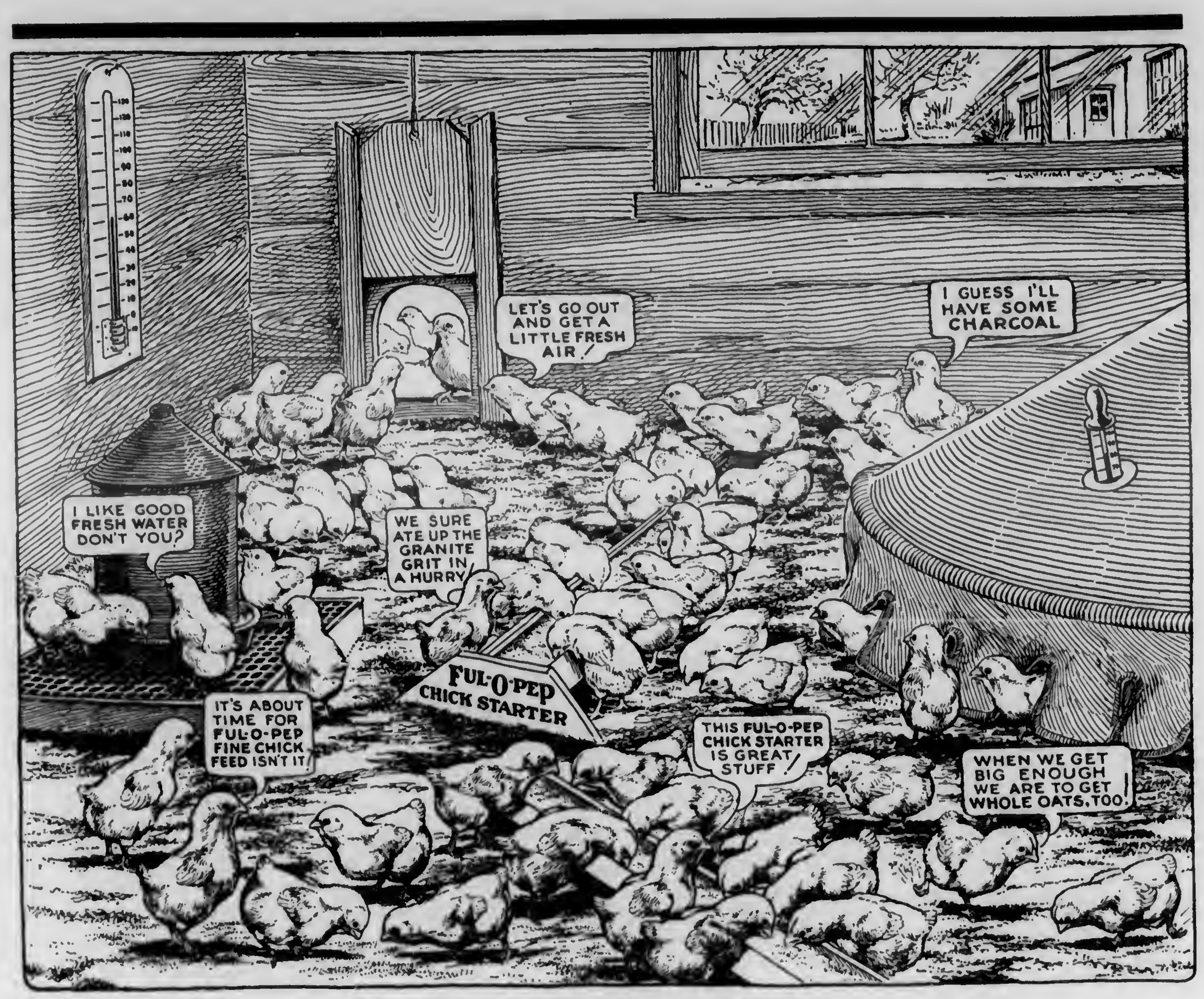
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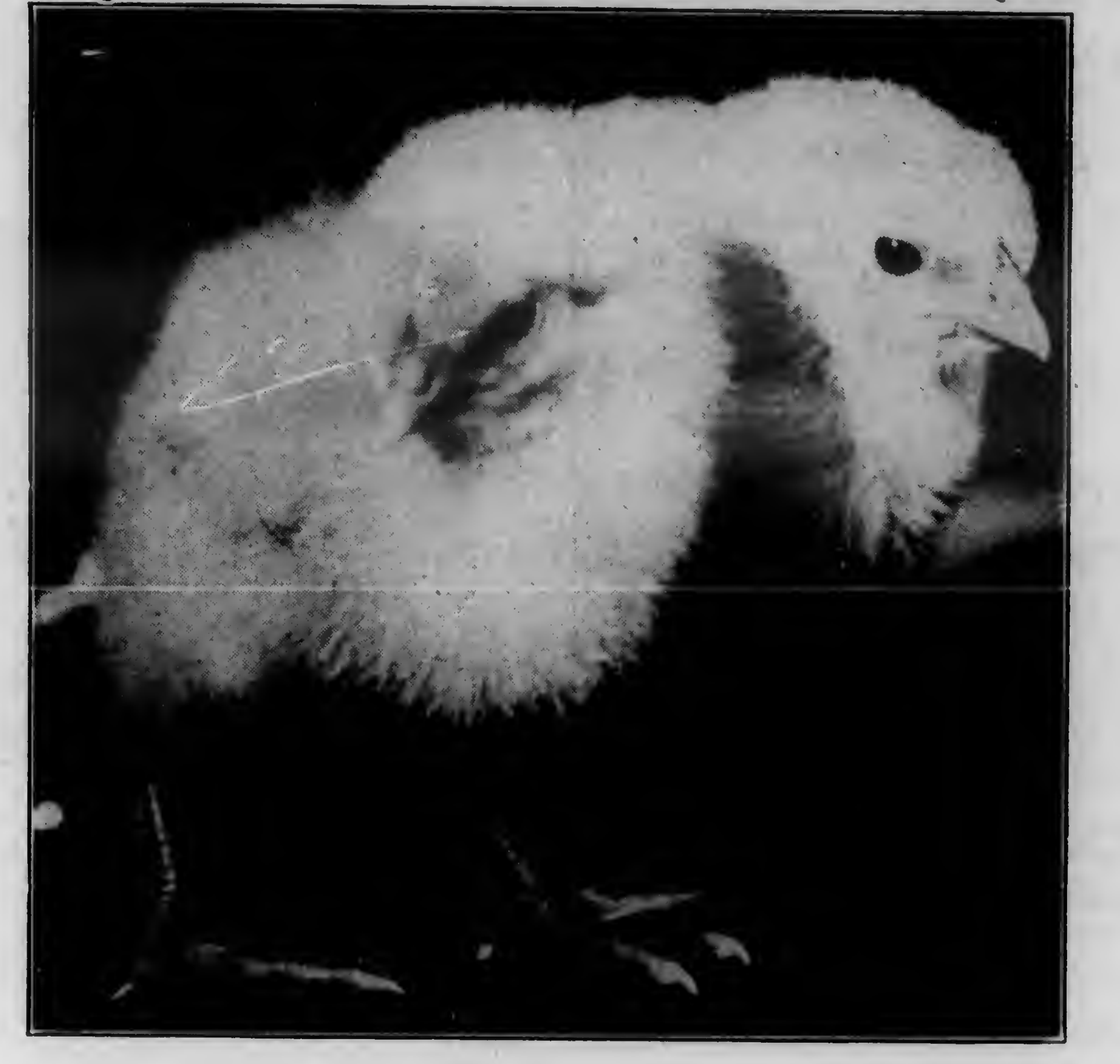
PART I



CHAPTER I

Start With Good Chicks

The first important step for you to make in your poultry keeping is the selection of good chicks.

You may either produce them yourself or buy them from some one else—but if your poultry keeping is to become successful, those chicks must be good ones.

Stop and think over the fact that it takes just as much feed, just as much fuel, just as much attention, just as much equipment, in fact, just as much investment in every way to raise cheap chicks as it does to raise chicks of a little extra quality. Then you will see what a wise investment a few cents extra in the beginning can become.

Sanitary Incubation Necessary

In selecting good chicks there are several things to ask yourself. Are they disease-free and healthy? Are they backed by a sound breeding program? Can I depend upon the breeder or hatchery for fair, honest treatment?

If the chicks are to be disease-free they must come from not only good stock but from clean, sanitary incubators. The hatching room should be clean in appearance. The incubators and equipment should be well sterilized with disinfectants. The stock from which the eggs are produced should be blood tested and free or nearly free of reactors. The reactors are the breeders who possess the ability to pass white diarrhea (pullorum disease) on to the chicks through the eggs.

As to production and other factors, the quality of the chicks when matured will be about the same as the stock from which they were produced. Baby chicks backed by definite pedigree breeding can be ex-

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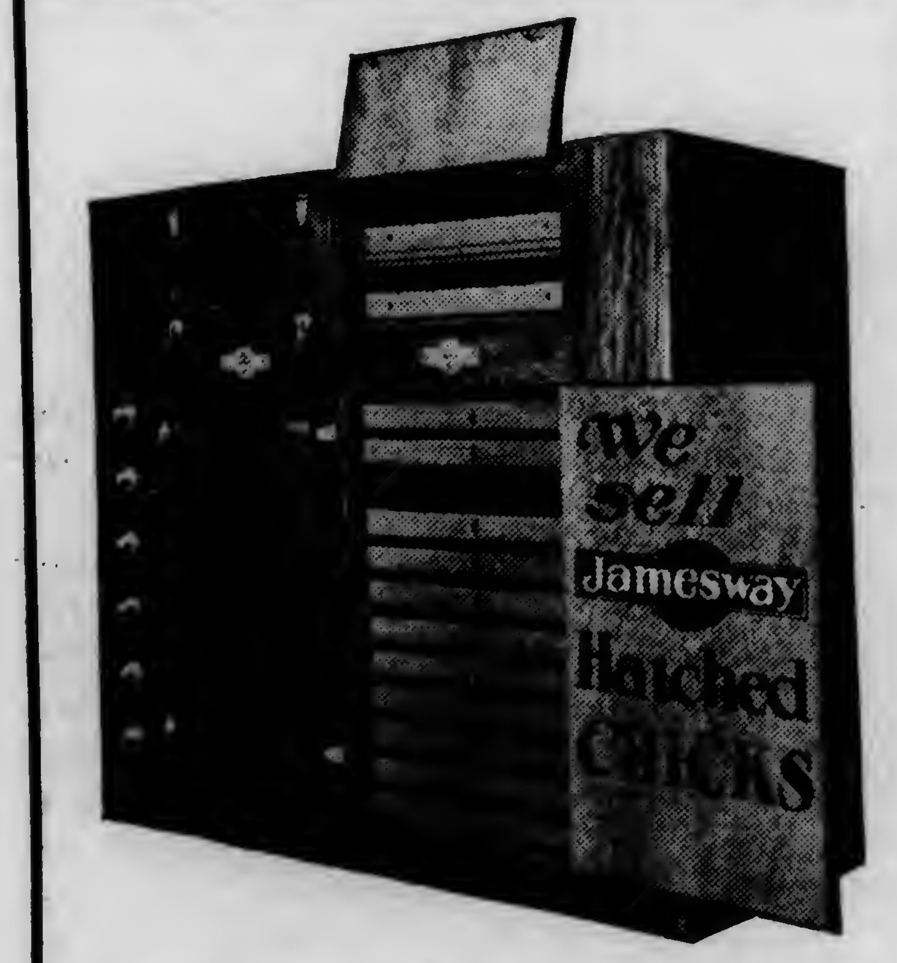


The man who wants to build a sound income producing business from LARGE hatches of LOW COST Blue Ribbon chicks will find the JAMESWAY most helpful to his success. Used by many of Pennsylvania's breeders. Catalog on request.

JAMES MFG. CO. ELMIRA, N. Y.

pected to give better results than chicks having just a random ancestry. An increase of many eggs per hen per year often results from the use of a little better blood in the seed stock from which any hatchery flock is developed.

If the hatchery or breeder from whom you have been getting your chicks has been giving you chicks of this quality and has been fair and honest in his dealings you should not "shop around" for your chicks, for you can easily waste a whole season's profits in your experimenting. On the other hand, if you are not able to get chicks measuring up to the standards mentioned, you should investigate another source. Pennsylvania has a number of hatcheries and breeding farms that rank among the very best in the United States. You need not go far to get the quality you want.

It pays to buy strong, active, healthy chicks —chicks that will spend their time eating rather than hovering around the stove.

Attend the Meetings

The two educational programs, one at State College in the fall, and the other in Harrisburg at the time of the Pennsylvania Farm Show, are arranged for your benefit. Watch the poultry magazines and the Pennsylvania Poultry News for details about these meetings.

Each Yearbook is Different

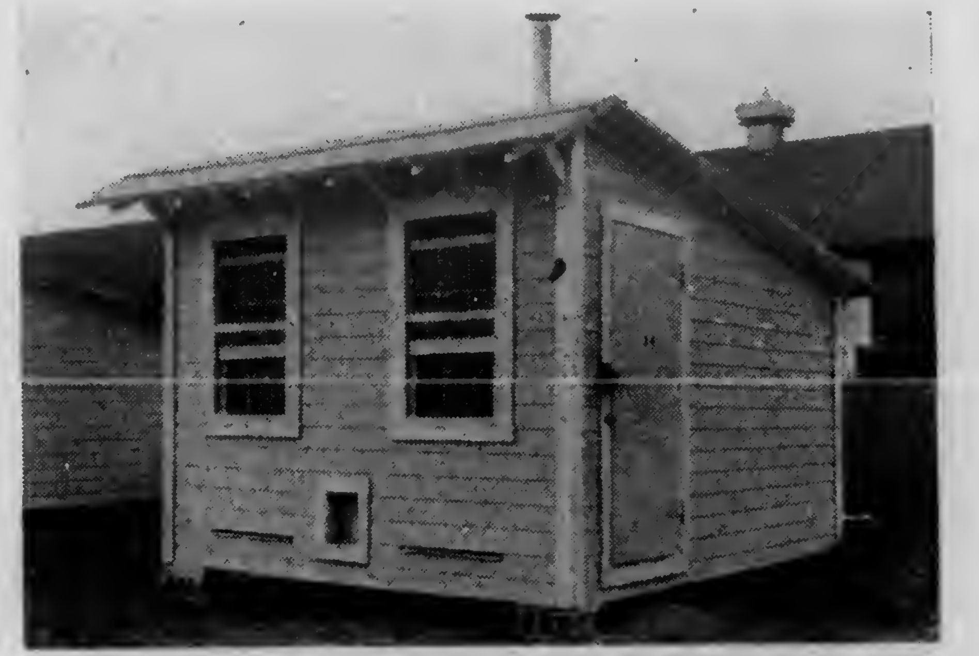
Each year we put out a book similar to this, but each year it is new and different, and of value and interest to each and every one of the members of the Pennsylvania State Poultry Association. Members receive free copies.

CHAPTER II

Give Them a House of Their Own

By H. H. Kauffman

Extension Poultry Specialist
Pennsylvania State College


Since only a small portion of farms in Pennsylvania brood enough chicks to make it economical to use centralized brooding systems, the colony brooder house meets the requirements of most Pennsylvania poultrymen.

According to the census reports for Pennsylvania, there are approximately 600 farms in the state on which 1,000 or more laying hens are kept, but there are 50,000 Pennsylvania farms on which there are 100 to 1,000 laying hens. These figures show that only a small portion of the farms brood enough chicks each year so that it is economical for them to use large centralized brooding systems. It so happens that the individual colony brooding house is best suited for brooding chicks on most Pennsylvania farms.

Colony houses can be moved from one place to another and the pullets can range on clean ground each year. They can also be taken a distance away from the mature chickens which is an aid in preventing disease from spreading from mature birds to the growing stock. On farms where ailments like cholera, bronchitis, laryngotracheitis, paralysis have a foothold the young stock should not be grown in the same building or even near the old birds. The colony house still is one of the best pieces of poultry equipment to help to prevent poultry diseases and grow good pullets.

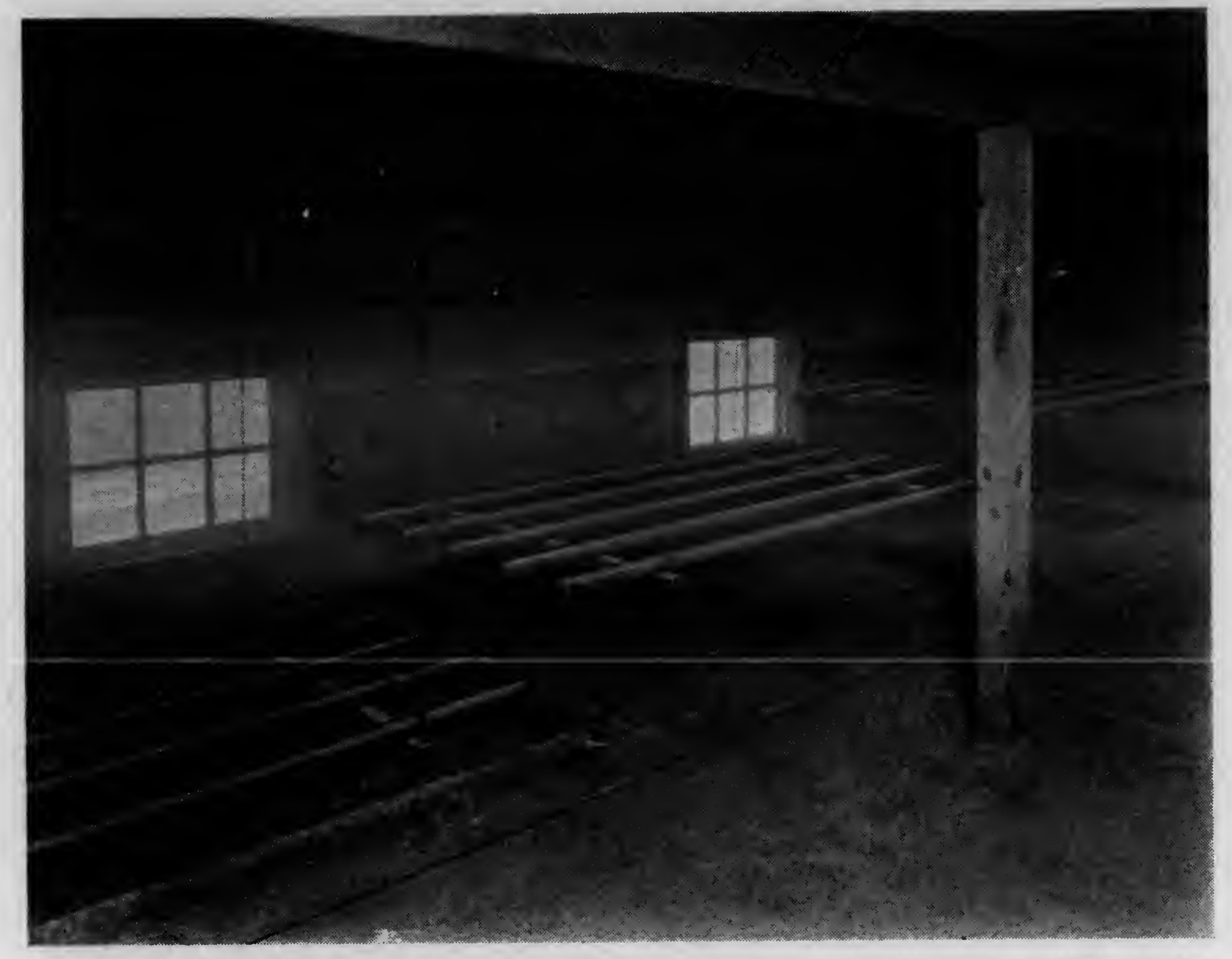
Determining the Size of House

The size of the colony house to be built must be determined first by the available power on the farm to move it to clean ground; second by the type of stove or brooder that is to be used; and third the number of chicks to be brooded. Colony houses 10 by 12 feet have been in use ever since brooder stoves have been used and that size house has proven itself well suited for most conditions. A good team of horses, a truck, or tractor has enough power to move them, and they do not strain and rack as much as houses of larger dimensions.

On Pennsylvania farms hard coal, soft coal, wood, oil, gas, and electricity are the principle fuels used for brooding. With coal and wood burners a certain amount of fuel must be kept burning to keep the fire alive. A house smaller than 10 by 12 is not practical for wood or coal because the heat cannot be kept down during milder weather even when the fire is idling. The gas, oil, and electric heat can be kept alive with generating only a little or no heat. For this reason these three types of brooders are better suited for smaller sized houses, and can also be used in the large ones.

Three Chicks Per Square Foot

The maximum capacity of a house is about three chicks per square foot, and up to 350 can be brooded in a 10 by 12. With this number in the house the chicks should get out doors at least by the time they are two or three weeks old or the cockerels removed to make more room for the developing pullet. A practice often followed is to place 250 chicks in a 10 by



By means of roosting arrangements, such as those shown above, it is possible to use much of the same equipment for baby chicks, growing birds and adult birds, thus making use of your laying house the year 'round. These roosts are constructed from 2 by 2-inch lumber. Pits covered with wire netting are used instead of the common droppings boards. The roosts at the very left are resting on the wire-covered frames. This is a suitable position for the young chicks just learning to roost; although netting of finer mesh is necessary for the youngsters than for the older birds, to keep them from slipping through. The roosts in the center are raised in the position suitable for growing birds, while the roosts at the right are in position for adult birds.

12 for winter brooding when they cannot get out doors, and 350 for spring brooding.

Hinged roosts should be placed on the back wall. They should be hinged 18 to 24 inches above the floor and inch and a half mesh, 16 gauge, or a similar suitable wire should be placed between the roosts and roost supports. These roosts can be pulled against the rear wall when the chicks are small but at about three weeks they can be put down, sloping to the floor. This roosting arrangement helps to encourage early roosting. Early roosting helps to prevent crowding, helps to keep the litter cleaner, causes the chicks to feather out better, helps to keep coccidiosis under control, and keeps down the number of runts and cull pullets.

Plans for a satisfactory 10 by 12-foot brooder house may be found in Leaflet 52 prepared by the Division of Agricultural Extension of The Pennsylvania State College.

Clean Management

Every precaution should be taken to prevent the carrying of disease and parasites from the old stock to the young. Avoid making direct trips from the laying houses to the brooder houses or chick range. Additional precautions include having a pair of overshoes or rubbers to wear only when caring for young stock and having a mat soaked in disinfectant at the entrance to the chick range. Dogs and cats often spread poultry diseases from one farm to another by bringing in dead chickens or by carrying germs on their bodies. Stray animals should be excluded from the chick range. Pigeons, English sparrows, and other wild birds may transmit diseases and, therefore, should be kept out of the poultry houses. Also keep visitors out of the poultry houses.

—Pennsylvania State Circular 121

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BEACON COMPLETE FEEDING SYSTEM

CHAPTER III

Brood With Care— It is the Foundation Work

By Prof. E. W. Callenbach

Poultry Department
Pennsylvania State College

A chick begins its life inside an egg. Its development there is controlled and limited by inheritance and the environment provided by the incubator and the egg. When hatched, the chick is freed from the influence of the egg. When removed from the incubator it is freed from the incubator's influence. However, it immediately becomes subject to the influence of its new surroundings. The person doing the brooding has the job of making these new surroundings conducive to steady and continued development.

The first step in this process is to so handle the chicks between hatching and placing in brooding quarters that chilling, overheating, and crowding are prevented completely. Furthermore, the chicks should be placed in brooding quarters as soon after hatching as possible. Early feeding is not harmful; in fact, the evidence available indicates it may be beneficial.

An unfurnished human dwelling is not a very livable place. Neither is an empty brooder house. The furniture in a brooder house normally includes a heating system, or brooder, feeding and watering equipment, a guard or fence to keep chicks near the warming area until they are definitely familiar with its location, and in some cases certain special equipment as a wire floored platform for feeding and watering equipment. A good form of litter furnishes the floor covering.

Start brooding the chicks as soon after hatching as possible. Early feeding is not harmful; evidence available indicates it may be beneficial. Operate your brooder to suit the chicks; their comfort is of greatest importance.

Battery Brooding

In these days, some poultrymen are raising their chicks for several weeks or months in apartment style—i. e., in batteries. Batteries are constructed so that the heat supply and water and feed containers are a definite part of the battery itself. Batteries are of two general types—first, unheated, in which case they must be used in a room carrying sufficient force-circulated heat to keep the chicks comfortable in all decks of the batteries; and second, batteries using either radiated or contact heat in one part, the other part depending for any necessary warming upon room heat. At present the general practice is to brood chicks in batteries from two to eight weeks after which they are brooded in floor pens or placed in unheated rearing quarters.

"Floor" brooding, in whole or in part, is still the most popular and widespread method in use today. A good heating system for a brooder pen may use coal, oil, gas, wood or electricity as fuel. Coal, wood, and for the most part, gas and oil burning brooders are generally classified as "warm room" types whereas electric and some gas and oil brooders are listed as "cool room" types. The principle difference between the two types is that with the former the heated area spreads out around the brooder canopy into the room while with the latter the heat is applied almost entirely to the area under the canopy and every effort is made to keep it there.

Different Management Required

Differences in heat application and heat distribution between "warm" and "cool" room type brooders make different management absolutely essential. Failure to recognize the basic dissimilarities is directly responsible for poor results obtained with both kinds of brooders by many poultrymen. Both types are desirable and useful if operated correctly.

A complete discussion of brooder operation is not possible here. A few suggestions, however, might be in order. These are:

1. The brooding capacity of a "cool room" brooder is limited to the floor space immediately under the canopy. The allowance of this space per chick must be regulated to suit the age and size of chicks in the pen. It should be ample.
2. The brooding capacity of a "warm room" brooder is limited in part by the floor area in a band about ten inches wide encircling the canopy. More frequently, however, the limiting factors are the optimum number of chicks per group for the particular poultryman and the floor space in the brooder house.
3. If an electric brooder is used:
   a. Have a high enough temperature under the canopy so the chicks can warm themselves quickly.
   b. In very cold weather feed the chicks under the canopy the first day or two.
   c. Elevate the brooder at night for good ventilation and lower in the day to conserve heat.
   d. In cold weather do not become unduly alarmed if the litter becomes damp. If it becomes wet just inside the brooder curtain where most of the chicks sleep, replace with clean dry litter. Rake the litter daily to permit the air to circulate through it.
   e. Do not reduce the temperature under the canopy too rapidly or too low. Instead, elevate the hover a little more at night.
4. If a "warm room" brooder is used:
   a. Adjust the temperature so the chicks will rest in the 10-inch zone adjoining the edge of the canopy.
   b. Reduce the temperature gradually, the speed of reduction conforming to the comfort of the chicks.
5. There is no conclusive evidence to show that "warm" or "cool" room brooded pullets are inferior or superior to each other. Research conducted at The Pennsylvania State College shows there is no particular difference in growth, feather development, mortality, or productiveness. If the brooder is a substantial piece of equipment with a satisfactory control mechanism and sufficient heating capacity for any temperature, its type is of little importance. Cost of fuel and

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A great many poultrymen have found sunporches attached to the brooding quarters of great aid in preventing the spread of infection. Raised off the ground, and having wire floors, these sunporches prohibit the chicks access to their droppings, while allowing the birds out in the fresh air and sunshine. By the use of sunporches, the poultryman is able to increase considerably and safely the number of chicks he puts in one house.

the workmanship of the brooder operator are the controling factors.

6. When using a brooder—**operate it to suit the chickens.** That's why you're using it.

Feeding and Watering Equipment

There are innumerable kinds and sizes of feeding and watering equipment for brooding chicks. There are three requirements for any to be satisfactory. The first is sufficient size and capacity to conserve labor. The second is proper construction to keep the feed or water in and the chickens, except for their heads, out. A third is simplicity of construction, so that the poultryman can make or repair them easily and so they will not be forever getting out of order.

Growth and increased appetite make day-old chick-size feeding and watering equipment useless in a short time. Chick feeders can usually be replaced in from 6 to 10 days and hen-size fountains

Sufficient size and capacity to conserve labor is one requirement of a good watering device for baby chicks, growing stock, or adult birds. After the chicks are from six to ten days old, hen-size fountains can be used. Make the change as soon as possible to save yourself extra labor.

The use of a wire platform to keep the fountain off the floor so the chicks cannot get at the wet and dirty litter is widely recommended.

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used after one to two weeks. Making the changes as promptly as practicable will avoid feed wastage and much useless labor.

Hardware cloth, woven wire, corrugated fiber board, metal, and wood may be used in the construction of a guard. The guard should be 12 to 18 inches high and long enough so the floor area encircled may be increased several times before the guard is removed entirely and the chicks given access to the whole pen.

Feeding the Chicks

There are at least as many good chicken rations as there are state experiment stations and commercial feed companies. Moderate differences in analysis or formula are relatively unimportant, providing essential ingredients are present in sufficient quantity. Similarly, successful poultrymen, vary in their feeding methods from all mash to grain only with milk as a drink. The orthodox, and probably the most universally practical, method of feeding chicks during the brooding period is to keep a good mash mixture, reasonably high in protein content, in hoppers before the chicks constantly. Grain can then be fed at the pleasure of the poultryman, in limited or unlimited quantities, in troughs, hoppers or in the litter, starting at any age up to about eight weeks after which grain or pellets should definitely be fed unless a lower protein mash is used.

A lack of vitamins D and G and an oversupply or improper balance of minerals are probably the two factors of greatest concern in a chick ration. The former is guarded against by the use of correct amounts of suitable fish liver oils and dried milk while the latter is usually due to the poultryman adding some mineral or mineral mixture to a ration which is already supplied with a sufficient quantity of the mineral or mixture.

The Sanitation Program

The writer has yet to hear or read a good definition of sanitation as applied to poultry. Except to a limited extent in laying cages, poultry cannot be treated as individuals but must be considered and managed as GROUPS of individuals. This condition, plus the fact that poultry feeding invariably enables and frequently requires chickens to "eat off the floor" presents a situation where sanitation as

[Please turn to page 39]

CHAPTER IV

Get Them on Range Early

By C. O. Dossin

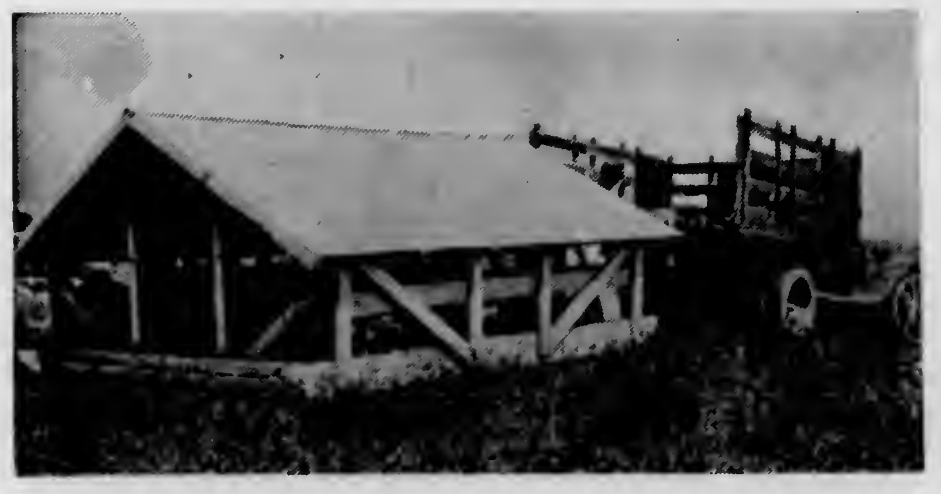
Pennsylvania State College
Extension Poultry Specialist

Poultrymen should give more attention to the kind of range on which they attempt to grow their young stock. Rolling land is the most satisfactory for range even though it is a little more work for the poultryman. Fields of this type will be washed a little by storms and will be free of stagnant pools of water. An open, porous soil providing good drainage is ideal. This land, however, should be fertile enough to grow a good cover of blue grass or some legume. Many poultrymen of late have been leaning toward blue grass ranges. A range of this type provides a desirable kind of greens for the birds through the greater part of the growing period.

Some Legumes Undesirable

Some of the legumes make a rank growth entirely covering the ground. The sun then does not have an opportunity to destroy the disease organisms which may have been voided in the droppings. Then, too, in wet weather these coarse growing legumes may be matted down providing ideal conditions for the growth of snails and slugs which may be factors in the spread of tape worms.

When a blue grass range is used, it generally is not desirable to plow it up after the chickens are removed. The brooder houses should be moved if possible so that the chickens will not be brooded in the same place oftener than once in three years. The bare spots near where the houses stood should be worked up and reseeded. Some poultrymen have been successful with a two-year rotation of ranges, and others have not moved their houses for a number of years. The amount, kind, and slope of the land available will be the determining factors as to the rotation program followed.



By building your shelters on skids, you can move them easily and frequently to new locations.

A shelter built to accommodate from 100 to 150 pullets has been found to give the best results. It should be located on a range having a heavy cover of blue grass or some other good legume.

Provide Some Shade

Shade is desirable on the poultry range, but it should be fairly high. High trees with the low hanging branches removed supply the ideal type of shade. Fruit trees are not always desirable for shade. The dropped fruit decays and draws flies which are a factor in the spread of tape worms. Then, too, many flocks reared in orchards eat so much of the fallen fruit that the intake of mash and grain is lessened and as a result the birds do not put on body weight. If trees are not available a few rows of corn or sunflowers should be planted across the range a short distance from the brooder houses or shelters.

Range Shelters

In recent years poultrymen have been building many range shelters. They have been built out of all kinds of materials and according to many different ideas. The main point to bear in mind is that the shelters should not be too large. A building which will take care of 100 to 150 pullets is as large as it should be built. When more pullets are kept in one building, the soil around it soon becomes bare and covered with filth. If possible, the shelters should be spaced at least 150 feet apart or moved frequently.

Plans for a satisfactory shelter may be found in Leaflet No. 40, entitled, "Summer Shelter for Pullets," prepared by the Division of Agricultural Extension of The Pennsylvania State College, State College, Pennsylvania.

Fountains and Feeders

If the range is so located that water can be piped to it, the poultryman is indeed very fortunate. Automatic fountains cut down on the work of caring for the birds.

When running water is not available, then the barrel type of waterer shown will help to cut labor.

Transferring Pullets to Shelters

As a general rule pullets should be well feathered, weaned from heat and roosting before being transferred to range. Some poultrymen have put birds in shelters early in April but the season, size, and conditions of the birds will be the deciding factors when they can be put out. Early in the spring the shelters should be enclosed on the two sides and the rear to give the birds some protection. For the good of the range the ground should be well dried out and the grass nicely started before being used in the spring.

Feeding Pullets on Range

There are many different systems of feeding growing pullets. Some poultrymen will keep grain and mash in feeders before the birds at all times. Some will have only the mash before them and scatter scratch grain on the ground morning and evening. Recently, a few poultrymen have discontinued mash feeding of the growing pullets on range, raising their pullets entirely on scratch grain and some form of condensed milk, with quite satisfactory results. They do, however, start giving the birds mash again just before they are ready to start laying.

The majority of folks, however, are putting sufficient dry mash in the feeders each morning to last until the middle of the afternoon and then allowing the birds to go without dry mash for a couple of hours. The birds are then given a heavy grain feeding. Enough is fed so that some will be left over until morning. Feeders filled with oyster shell should also be available to the birds when they are put on range.

Several weeks before any pullets are ready to start laying, batteries of nests should be put into the brooder houses or attached to the shelters. These pullet educators, or nests, will help to eliminate many floor eggs after the pullets are confined to laying quarters. They help also to eliminate stolen nests and will reduce the number of soiled eggs gathered on range.

Poultrymen can well afford to pay more attention to the kind of land on which they grow the young stock. Rolling land usually is the most satisfactory range.

Nests attached to shelters and separate nest shelters help to train the birds where to lay.

It is a general practice to transfer the pullets to laying quarters if conditions are satisfactory at about the time they are ready to lay. The pullets should be graded to size and development as they are being housed.

Plan to Join the Next Poultry Tour

During August of every year, your Pennsylvania State Poultry Association sponsors an organized tour. This tour provides an excellent opportunity for you to combine business and pleasure while visiting the farms and places of interest in Pennsylvania and surrounding states.

The 1937 tour started at Harrisburg and worked its way East, visiting outstanding poultry farms in eastern Pennsylvania and New Jersey, culminating at New Brunswick, New Jersey, where the Pennsylvania tourists joined with those from the other northeastern states for the annual summer meeting of the Northeastern Poultry Producers Council.

Plans are being made whereby the 1938 tour will travel up into New York state, visiting poultry farms along the Hudson Valley and through the Catskills. It promises to be a most enjoyable and educational tour.

There are no registration fees, and meals and lodging rates are always low. Watch for details about the 1938 tour in the national poultry magazines and in the Pennsylvania Poultry News.

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CHAPTER V

But You Can Grow Them In Confinement if Necessary

By Prof. H. C. Knandel

Head of Poultry Department
Pennsylvania State College

It is only during the past 15 years that scientific truths have been discovered which make possible raising chicks in confinement and maintaining mature fowls without access to range.

The method of management to be employed in raising chicks depends to a large extent upon local conditions. If a clean, sanitary range is available then by all means do not raise chickens in confinement. But how does one know that the range is free from parasitic infestation or disease infection until the chicks have been allowed to roam over it? Because of this uncertainty and since strong, healthy, vigorous pullets are necessary for successful poultry keeping, some poultrymen and farmers have adopted the confinement or a combination of the confinement and range systems in rearing their young stock.

Confinement System Fairly New

The confinement method of poultry management as herein described refers to a method of raising chicks from hatching time to maturity and the maintenance of mature fowls without access to range. Only during the past fifteen years have scientific truths been discovered which make this practice possible. Years ago, an effort was made to raise chickens out of season, so to speak, but it was discovered that when the chicks reached a certain age, they were unable to walk. Their leg bones were deformed and poor growth resulted. If, however, these chicks could be given range, normal bone and growth development were produced. To provide good range conditions during the winter months in Pennsylvania is of course impossible. Thus, the common practice was followed of hatching chicks in March, April, and May. Now there is no season of the year in which chicks cannot be hatched and properly grown to maturity for we know that by the addition of a small amount of fish oil potent in vitamin D, chicks will grow into strong, sturdy fowls regardless of the time of year they are hatched.

Since it is often difficult to obtain a range free from parasitic infestation, the confinement method of rearing has been adopted. Round and tape worms affect the mucous membrane of the intestinal tract and render it inefficient for proper assimilation of food. It is a far better plan to prevent worm infestations than to try to remove the worms.

There is no remedy on the market, with which the writer is familiar, that will remove all tape or caecal worms from a fowl. On the other hand, it should be clearly understood that fowls raised in confinement may become worm-infested if the surroundings are not kept scrupulously clean.

Preparation of Brooder House

Regardless of the brooding system employed, sanitation at all times is essential. Start right by washing the house out thoroughly. Then scrub the floor and up the side walls for a distance of 2 feet with a solution of hot water and lye—using one can of lye to 12 quarts of water. After the house has been allowed to dry thoroughly, apply a 2 per cent solution of a good coal tar product. This material should be sprayed over the entire interior of the house. Then allow the building to stand idle with the windows open so that the sun may enter and continue to disinfect the interior.

Keep Out the House Fly

Years ago, we fly-screened all openings since it is known that the house fly is one of the intermediate hosts of the tape worm. Thus one way to break up the life cycle of the tape worm is to eliminate the fly.

In the front of each brooder house construct a sun porch which will allow the growing stock ample head room and floor space. In a 10 by 12 foot brooder house we use a 6 by 8 foot sun porch. Not more than 200 chicks are placed in a house of this size. The cockerels are removed as soon as they can be detected, leaving the remaining pullets the entire use of the brooder house and the sun porch. This is sufficient space to raise 80 to 90 pullets to maturity.

The floor of the sun porch may be of heavy galvanized wire or concrete. If the latter is used, frequent cleaning is necessary. This can best be accomplished by the use of a hose. The sides and top of the porch are of woven wire construction. The sun porch should be at least 3 feet high to provide ample head room for the pullets.

Under the confinement system, careful supervision can be given and rigid sanitation maintained. It is a good plan to use a litter in the house which will absorb the droppings and moisture. Peat moss, shavings, and ground corn cobs have proven quite satisfactory. No litter is used on the platforms. Since floor space is at a premium, it is very desirable not to clutter up the floor with equipment. For this reason, all mash hoppers are hung by chains from the ceiling and are adjustable for various aged birds. A six or at most an eight-foot hopper is to be preferred to a longer one. In a 10 by 12 foot brooder house, two six-foot hoppers so constructed that the chicks have access to the feed from both sides will furnish ample feeding space.

Rations for Confined Chicks

In so far as the facts are known, the feeding of a complete ration is essential when chicks are raised in confinement. All the minerals, and nutrients including the proteins, carbohydrates and vitamins must be made available. Birds on range have the opportunity to obtain green food, minerals and some animal protein but not so with chicks reared in total confinement. In our earlier work, we used to feed green clover and alfalfa daily. Recently, we have adopted the practice of using about 7½ per cent of alfalfa meal in the mash. This appears to answer the purpose quite as well. The following ration is one which we have used for a period of several years

Under the confinement system, very careful supervision is most necessary to keep the birds in good physical condition. It pays to check the body weights of the birds regularly to be sure that they are gaining.

with good results. It may be modified to better meet your own conditions but do not omit any of the ingredients for each is placed in the ration for a definite purpose:

Ration and Suggestions for Feeding Chicks

MASH

350 lbs.	ground yellow corn
150 lbs.	wheat bran
150 lbs.	wheat middlings
100 lbs.	ground heavy oats
*50 lbs.	meat scrap
50 lbs.	fish meal
75 lbs.	dried milk
75 lbs.	alfalfa meal
**10 lbs.	calcium carbonate
***10 lbs.	cod liver oil or sardine oil
5 lbs.	salt
1025 lbs.	total

GRAIN

100 lbs.	medium cracked corn
100 lbs.	wheat

Barley, oats or buckwheat may be added to the grain mixture in an amount not to exceed 25% of the total grain mixture.

* In place of 50 pounds of meat scrap and 50 pounds of fish meal, 100 pounds of either meat scrap or fish meal may be used.

** Calcium carbonate refers to finely ground oyster shells, ground limestone of high calcium and low magnesium content, or to other good sources of calcium. Even though calcium carbonate be included in the mash, it is desirable to supply a good source of calcium in coarser form. It is the common practice to start feeding this supplement in small quantities on the top of the mash when the chicks are about four weeks of age and as they grow older this material in larger sized particles should be supplied in hoppers. Insoluble grit should be supplied in the same manner.

*** Early hatched chicks, which do not have access to direct sunlight should be supplied with a potent source of vitamin D. It is not absolutely necessary to feed a vitamin D oil to chicks on range although the feeding of a pint of good cod liver oil or sardine oil, to 100 pounds of mash is a good practice. A good grade of oil should contain 100 U. S. P. units of vitamin D per gram. There are various brands of cod liver oil in which vitamins A and D have been concentrated. Follow the manufacturer's recommendations when using such a product.

Feeding Schedule

Day old to eight weeks — Feed mash in hoppers. Limited amounts of chick size scratch grain may be fed as soon as the chicks are placed in the brooder house. After the chicks have learned to eat the grain it should be constantly available in separate hoppers.

8 weeks to 12 weeks—Continue mash and grain feeding. Coarse cracked corn may be used in place of medium size cracked corn.

12 weeks to maturity—Continue mash and grain feeding. Reduce the dried milk to 50 pounds. If whole corn is to be fed to mature birds, at 12 weeks of age, substitute whole corn for a part or all of the cracked corn in the grain mixture.

Results and Advantages of Confinement

With the increasing amount of knowledge regarding the management and feeding of confined birds available today, a great many poultrymen, especially in the East, have turned to two-, three-, and even four-story poultry houses.

A summary of the results and advantages of the confinement system which we have followed for the past ten years may be listed as follows:

1. Chicks hatched from eggs laid by fowls reared and maintained in confinement make uniformly good growth.
2. Eggs from fowls reared and maintained in confinement hatch very satisfactorily.
3. Mortality among chicks raised in confinement is low.
4. Less round and tape worm infestations occur with confined birds than is usually the case when chicks are provided with range.
5. Chicks make very satisfactory growth and development.
6. Egg production in mature stock is the equal of range reared birds.
7. This system gives an opportunity for careful supervision.
8. It permits a constant and accurate check on all chicks.
9. It prevents loss from hawks, crows and vermin.
10. It avoids the intermingling of various ages of chicks as on free range.
11. It tends to prevent thieving.
12. Less land is required for raising poultry and makes possible the factory method of poultry management.
13. The flesh of fowls reared in confinement is excellent table quality.
14. It is a way out for the poultryman who is unable to rear chicks successfully on free range.

News Comes Bi-Monthly

Every two months members receive a copy of Pennsylvania Poultry News. It is a bright little paper filled with special news of specific interest to the poultry growers of this state. Many members say that a year's subscription to the News alone is worth the small Association membership fee of $1.00.

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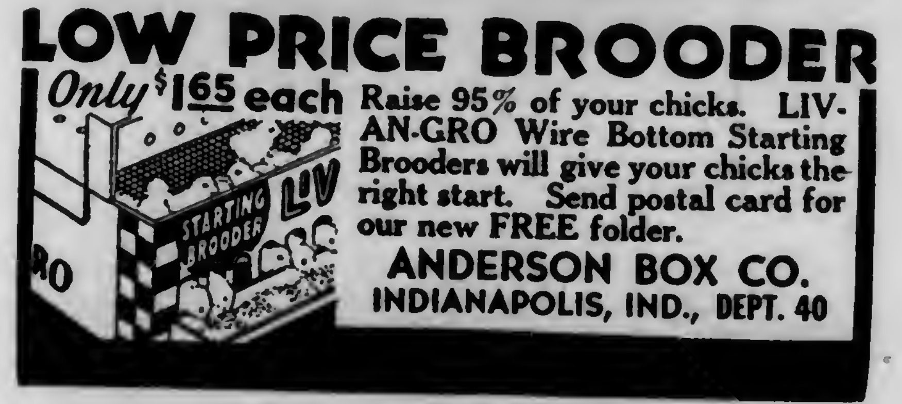

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Springfield, Massachusetts

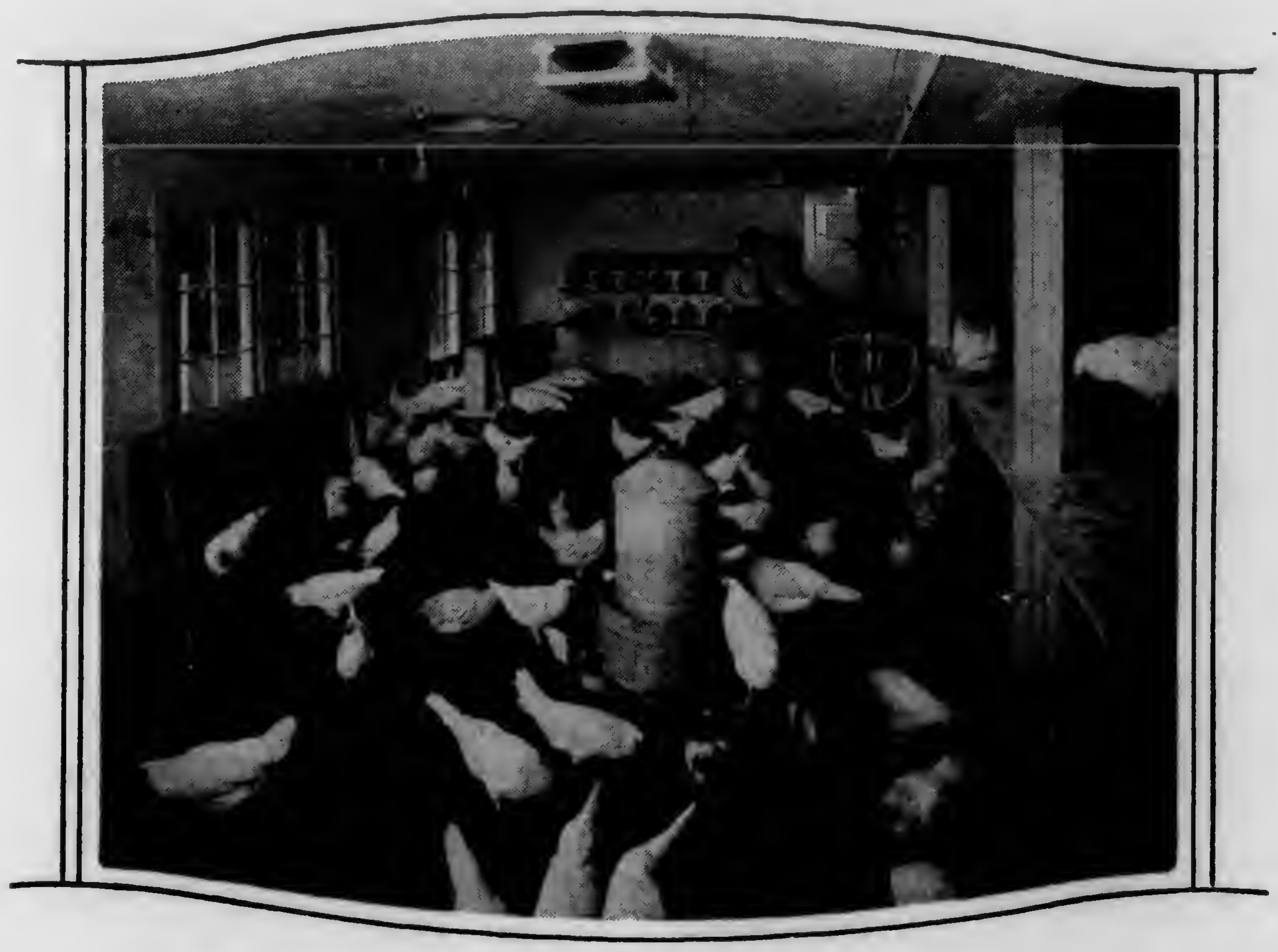
PART II

CHAPTER I

House the Pullets Early

By F. H. Leuschner

Extension Poultry Specialist
Pennsylvania State College



Every poultryman looks forward to the time when the new crop of pullets is ready to be housed. They represent so much, not only in personal effort and the cost of production, but also in his future hopes from the standpoint of egg production and ultimate flock improvement.

A crop of "sweet" pullets is a beautiful sight to behold. The conditions under which these pullets are kept—the attention they receive at housing time—are factors which may make or break them. After all, chickens are creatures of habit and are affected by sudden changes in environment and management. At housing time they are approaching maturity; a big change in their physiological make-up is occurring. Anything the poultryman can do to aid the well-being of his fowls at this time will be repaid, many fold in the days to follow.

Facing the Problem

Pullets are best housed before they come into production so they have time enough to get used to their new quarters. Thus the possibility of a molt due to the change from range to laying house while in full production may be eliminated.

The value of the small group system of housing is apparent at this time whether the colony system is used or continuous type and multi-story houses are divided into pens for 100 to 150 fowls each. Certain houses or rooms can be emptied during the laying year as culling and mortality reduce the flock size. These rooms can be prepared for the new pullet crop when other farm operations are not so pressing, and then those pullets which have matured most rapidly can be taken off range and housed.

It is at this season, moreover, that the poultryman appreciates the value of a plan for his annual operations. Often there is inadequate housing space for the new pullets, the older fowls are still in good production and then the poultryman is certainly "up against it." On commercial poultry farms the use of hen shelters would be justified because then the older fowls could be transferred at a season when production is not so apt to be affected by the move and the regular laying quarters prepared for the new pullets. When pullets come into production on range adequate nesting facilities must be provided. Such nests may be placed inside the colony houses or hung on the outside walls and on range shelters. Some poultrymen have portable nest sections, roofed over for protection from heat and bad weather which are stationed between colony houses on range.

Certainly, some kind of a workable plan for his operations would enable the poultryman to anticipate the needs of his fowls and provide sufficient opportunity for their normal development.

Getting the House Ready

When the laying pens have been emptied, the portable house equipment can be taken outdoors and both house and equipment put in order for the new occupants. Sufficient time should be allowed prior to housing pullets for the necessary repairs to house and equipment to be made. Leaky roofs should be repaired; walls sealed against cracks which allow winter drafts; rat holes closed up and a program begun which is designed to clean up on these income-reducing rodents; all remodeling to be done so the house will be more comfortable for the fowls and increase efficiency for the poultryman.

In remodeling, give careful thought to the requirements for ventilation; allow 6 to 8 inches of roosting space per fowl; at least 3 inches of feeder space per bird and one nest for every three to five pullets. Calculate your house capacity on the basis of 3½ to 4 square feet of floor space per bird. Provide additional hopper space for feeding grit and oyster shell, fresh-cut greens, and for grain as well as the mash feed. V-shaped troughs used for night grain feeding also can be used for wet-mash feeding at noon. Nests are best placed on the side walls for ease in cleaning and gathering eggs. Feeders should be so located that a maximum of natural daylight will be available to the fowls in feeding.

Thorough Cleaning is Necessary

Water under pressure is an easy and often quite satisfactory means for cleaning out a poultry house. First remove all litter and portable equipment. Then brush down the walls and inside of the roof. Use a scraper to remove all dried droppings from boards and floor. Scrubbing the droppings boards, lower walls and floors with a solution of lye and boiling water is valuable also. One can of lye to each 20 to 30 gallons of water makes an efficient cleansing solution. After the house has been thoroughly cleansed it may be advantageous to spray with a coal-tar disinfectant. Houses are brighter and more cheerful for attendant and fowls if interiors are then sprayed or painted with whitewash or some commercial preparation such as a white-drying disinfectant or cold water paint.

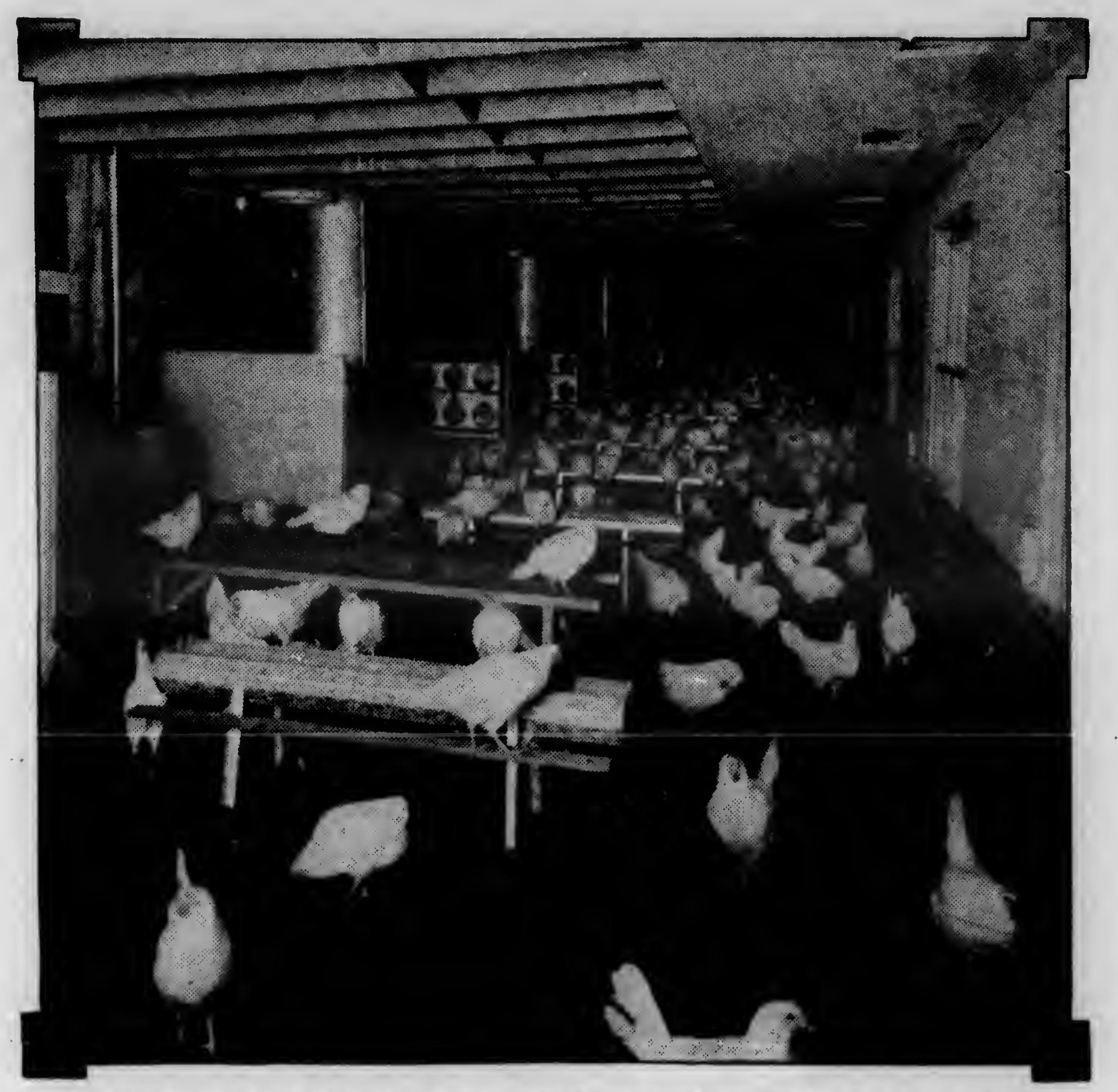
Droppings boards and roosts can be treated with various coal-tar preparations or with used crank case oil or a mixture of equal parts of the oil and kerosene as a precaution and treatment for mites. Neglect of this phase of management may mean an infestation of mites which will seriously retard the development and affect the health of your pullets.

Nests and other portable equipment should be thoroughly cleaned and disinfected before being returned to the house. In addition, the house should be allowed to dry out well in order that no effect of dampness might hinder the well-being of the fowls.

Only after the house itself is really in order are you ready for litter, nesting material, feed, water, records that you really mean to use, and the pullets themselves.

The Housing Job

Housing the birds is always somewhat of a job. Plan to use a method which requires the least handling of the fowls necessary. Place a number of clean turkey crates end to end at the house or chick door, leaving the ends of all save the last crate open. This makes a chute into which the birds can be driven for transportation after the crate ends have been replaced, examination, selection and grading prior to housing. Various types of home-made catching crates have proven of value.



The conditions under which your new crop of pullets are kept and the attention they receive at housing time may make or break them.

Some poultrymen prefer to catch the pullets at night and carry them to the new laying quarters. When large numbers of pullets are to be housed, this can be a very laborious process. In addition, it sometimes makes another handling necessary if the birds are to be carefully graded according to maturity.

Moreover, it is some job to house pullets which roost in trees. A good way to get these fowls is to lure them into the brooder house or range shelter by feeding grain near and in the house about a week before housing commences. Then, after feeding, the group can be driven into the house if the poultryman and his helpers are skillful, alert and above all, patient.

Grading and Selection

In many groups of pullets of the same age there will be some fowls which mature more rapidly than others. If the groups are to be housed at one time it is important that the ones more fully matured be kept separate from the less mature fowls. Then the latter have a better opportunity to feed and reach maturity with others of their own stage of development. If retained in the same pen with the more precocious pullets, they will be "bossed" around and not allowed to feed normally or as rapidly become adjusted to their surroundings.

When pullets are housed as they reach maturity, the job may be divided into several periods. First, the pullets which have reached maturity are selected. Within several weeks another lot will be ready. Usually after the third selection, all the really desirable pullets will have been obtained and the balance can be sold for market purposes. Thus the poultryman has graded his fowls and is assured of improved management methods and better results than when the entire lot is merely taken off range and housed without further thought of their real requirements.

Select and retain for producers only those strong vigorous fowls of good body weight, excellent length and depth of body and width of back. Clean, upstanding pullets with bright, prominent, well-rounded eyes in a shapely feminine head; showing the pigmentation of body and shanks which typifies good health and correct feeding; fowls which have been "tamed" by the caretaker, are the ones we seek to house for big returns in egg production.

Management After Housing

The change from an open brooder house, range shelter or trees to the laying house is quite abrupt and hence plenty of ventilation is needed in the laying house. Openings should be provided in the construction of the house so that cross ventilation will to some extent give the birds conditions similar to those prior to housing. Then as weather conditions demand, the change to winter housing management can gradually come about. Crowding and inadequate ventilation often are the cause of colds in newly-housed pullets. Moving the droppings boards out from the rear wall also allows for better air circulation in the house while the birds are on the roost. Never crowd fowls of any age, leastwise pullets to be retained for egg production.

Usually pullets are somewhat timid when first housed. The adjustment to the new surroundings, confinement, different types of feeders and other equipment may mean lowered feed consumption for a short time. Make it easy for them to find the feed and these difficulties are quickly overcome. Pullets may have difficulty in finding grain fed in very deep litter; hence, use of a thin layer of litter at first may be advantageous.

If fowls have been accustomed to fresh, succulent greens on range prior to housing it is a good plan to continue feeding some form of cut greens for a time at least, gradually tapering off as the supply becomes increasingly difficult to obtain. In order to check feed consumption and observe the birds' development into production it is a good plan to weigh and keep record of the amount of grain and mash consumed. Thus, the careful feeder can judge more accurately the amounts of each type of feed the fowls should be receiving, based upon their development, egg production, body size and fleshing, and the effect of weather conditions.

Establish regularity in your care of the fowls. Let them become accustomed to your presence among them and as they develop confidence in their attendant and the things they can expect of him as he enters the house, they will speedily be "tamed." During the early housing period the poultryman has the opportunity to make or break his fowls. Careful attention to details, studying the reactions of his fowls, keeping them busy and contented, are necessary if the best results are to be obtained. They represent the difference between profit and unnecessary loss.

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CHAPTER II

A Comfortable Laying House Has Plenty of Light and Good Ventilation

By Prof. Wm. C. Sanctuary

Massachusetts State College

Comfortable quarters are appreciated by the poultrymen as well as by the layers. Since poultry keeping is a business, however, the provision of comfortable quarters will depend largely upon the profitableness of such an investment. Comfort conserves energy, saves feed, increases egg production and apparently improves hatchability and the resistance to respiratory epidemics. Of course, providing quarters that are too warm, in which the air is dead, or worse quarters in which it is sometimes very warm and at other times more or less drafty cannot be said to be providing comfort. A house may be warm and damp but if there is positive air circulation, even though it be much restricted, if there are no drafts and if the conditions are non-fluctuating from day to day, very excellent results may be obtained.

What Can You Afford?

How much comfort can a poultryman afford to provide in his laying quarters? For some it is more than for others for the reason that one cannot afford to go bankrupt to make even very desirable investments. For others a completely insulated house assuring no frozen water, no changes of the litter in the winter and no heat prostrations in the summer will be an excellent long-time investment.

For those who must count their "pennies" very closely and who are favored with a plant location in which there is good ground and air drainage the genuine open front type of house will provide the cheapest building and the easiest to regulate. Illustration No. 1 shows a building erected on the plant of the State College at Kingston, Rhode Island. The roof made of galvanized iron is partially insulated against loss of heat from the birds in the winter and against too rapid a penetration of the sun's rays in summer because of the reflective powers of its shiny surfaces. The square pens with partitions of burlap prevent excessive drafts. The front requires no regulation because it is always open. The fluctuations inside are no greater than those outside which cannot be said of some houses all closed in warm, stormy spells and all open in sunny but often windy, cold weather. Layers have done very well in these real open front houses. The circulation in such houses is of the displacement type. See figures 2 and 8 in illustration No. 2. There is but little recirculation of animal heat in such houses. It is, therefore, damp inside in damp weather and dry when the sun shines. The litter, however, may average to be dry enough, sometimes even dusty, and require no change during the winter in some locations.

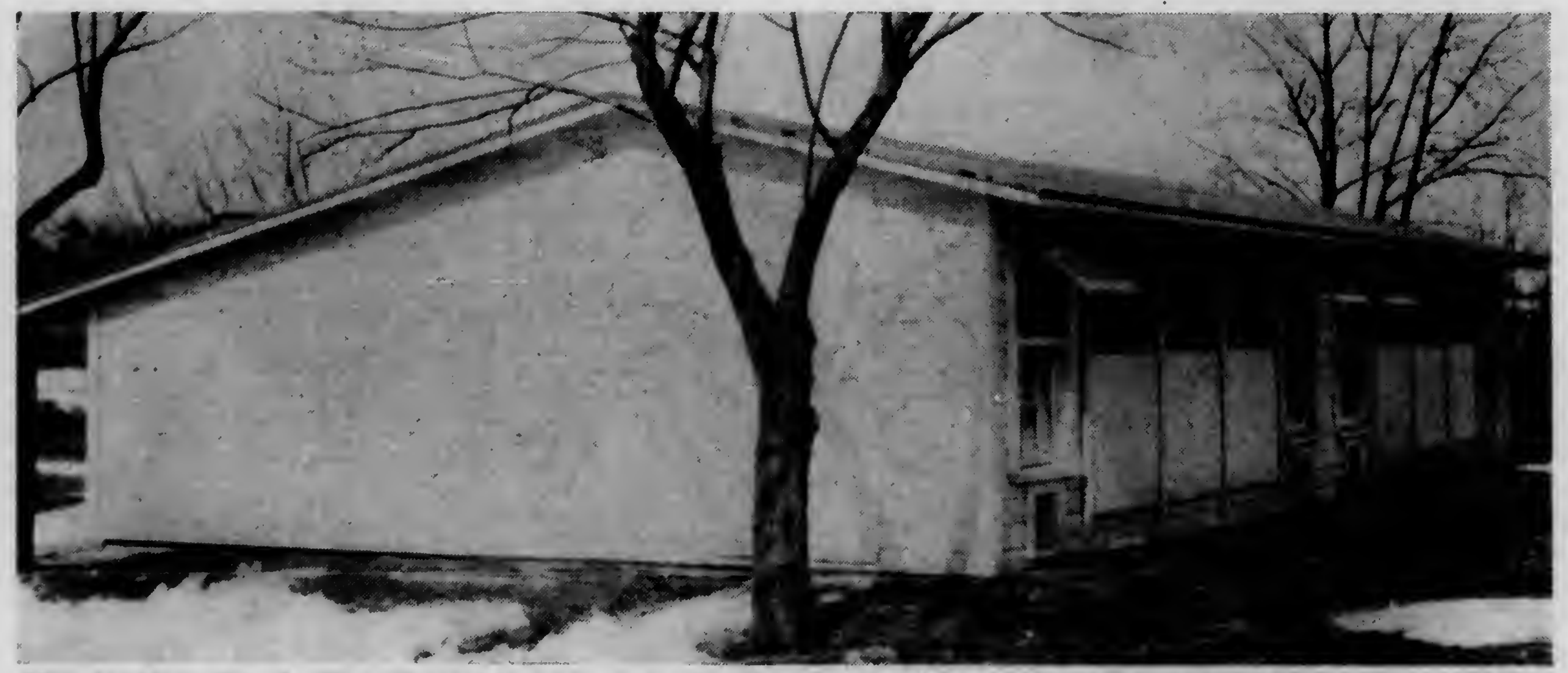
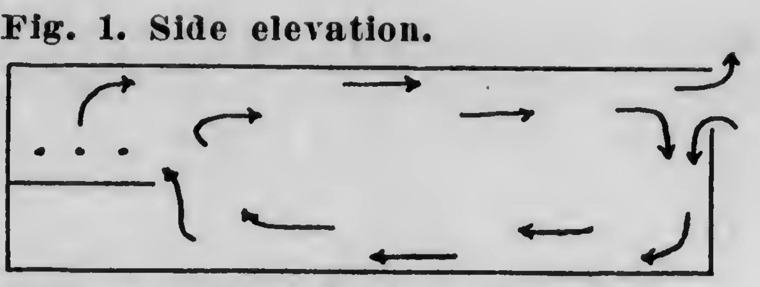


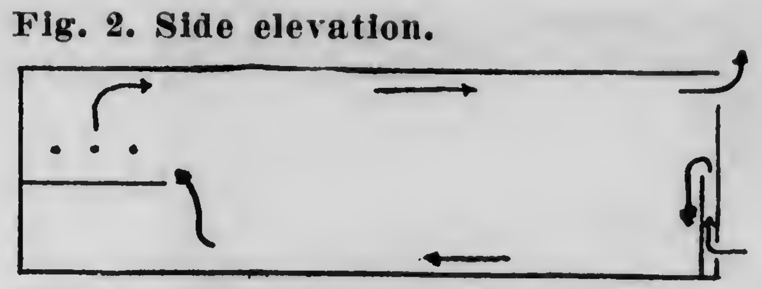
Illustration No. 3. The Pennsylvania type house is one of the best designed of all laying houses. Windows made of non-ventilating material are recommended for the three center sliding curtains.

Fig. 1. Side elevation.



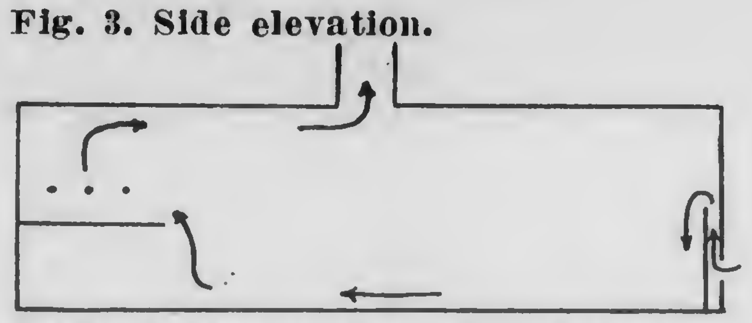
Winter vertical heat recirculation.

Fig. 2. Side elevation.



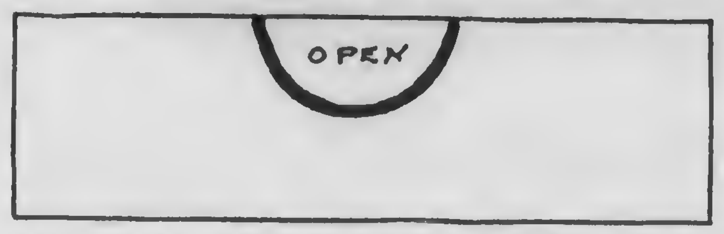
Winter displacement circulation. Cooling effect.

Fig. 3. Side elevation.



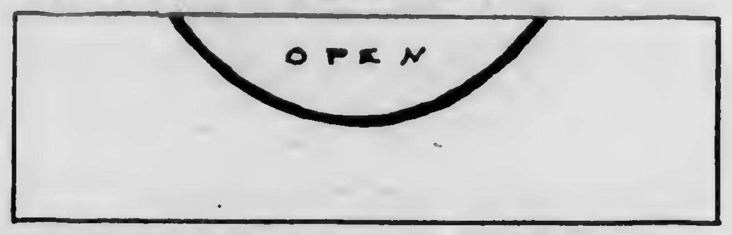
Displacement circulation. Undesirable in winter.

Fig. 4. Front elevation.



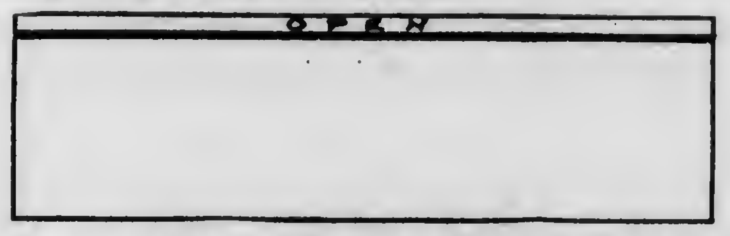
Idealistic adjustment. Windy winter day.

Fig. 5. Front elevation.



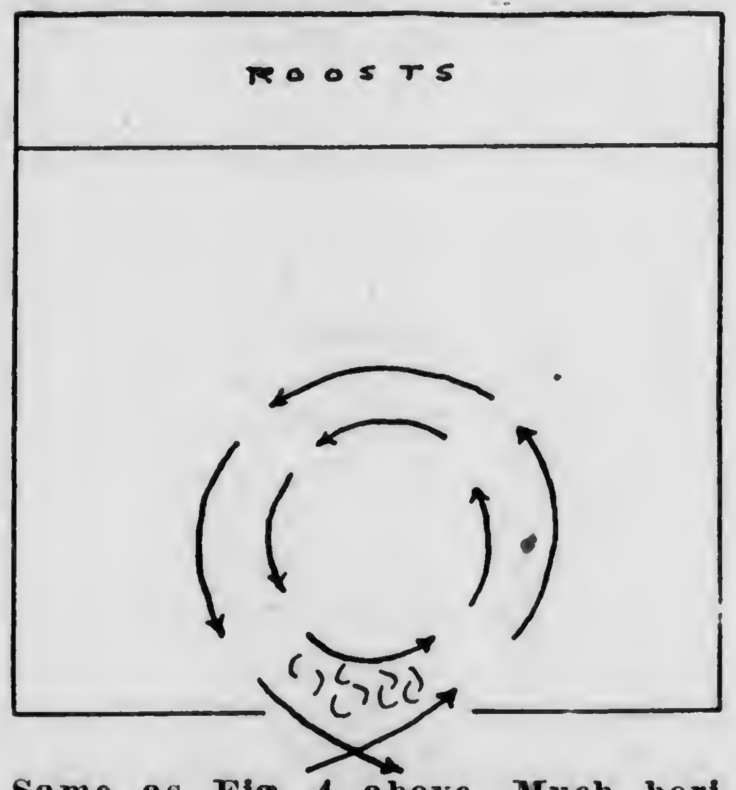
Idealistic adjustment. Cold, still, sunny, winter day.

Fig. 6. Front elevation.



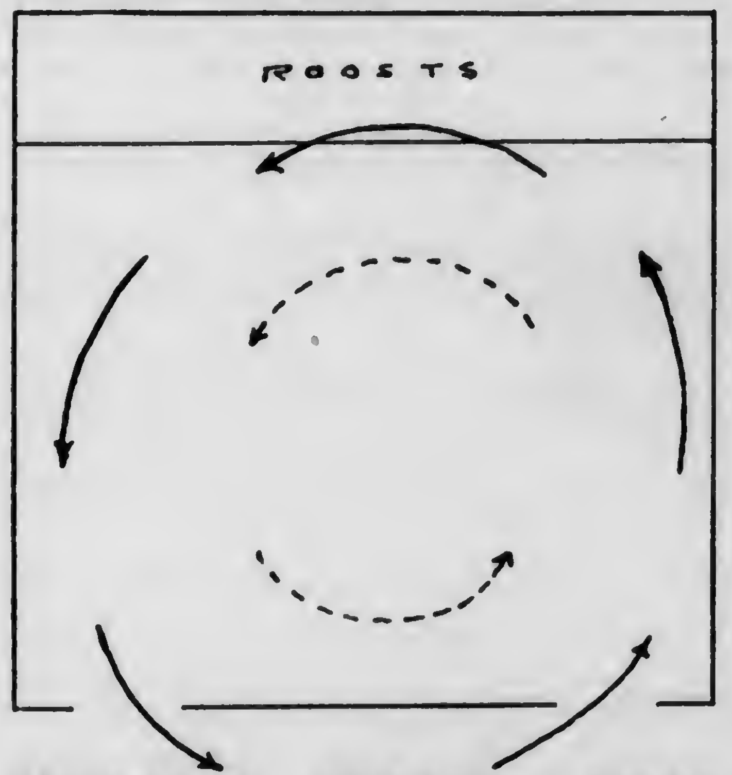
For winter. Still, foggy, warm, threatening weather.

Fig. 7. Floor plan.



Same as Fig. 4 above. Much horizontal recirculation.

Fig. 8. Floor plan.



Displacement circulation. Drafty, chilling.

Illustration No. 2. **Types of Poultry House Ventilation**

Good Results Not Always Obtained

In other locations the open front system of ventilation, dependent as it is upon the average dryness of the outside air, has

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failed to maintain dry litter and produce good results. For such locations some other principle besides the circulating of large volumes of cold damp air should be employed. Fortunately, as the temperature of the air is increased its water carrying capacity is enormously increased. If then, the interior warmed air can be mixed with the incoming cold air and be recirculated over the litter and close to the birds on the floor it will dry the litter and warm the birds. If, in addition, the walls and ceiling can be insulated or otherwise kept warm, as the ceilings of lower floors in multi-story houses, still more warmth may be retained and what is of additional importance, these warm surfaces will prevent the moisture in the air from being condensed upon their surfaces.

Securing Recirculation of Air

How may this ideal recirculation be produced in an ordinary hen house? By means of simple properly-placed ventilation openings. In a dairy stable, high intakes and low outlets through flues extended close to the floor, provide much recirculation and retention of warmth while still assuring positive circulation due to the relatively large amount of heat given off by the cows in the well-insulated stables.

In a poultry house with only about one-eighth as much heat to start with and many times no insulation at all to conserve the small amount of heat, such a system is very erratic in its operation and often produces very bad results. For this reason the so-called restricted front system of ventilation through use of a slot at the highest unobstructed point in the front wall in conjunction with non-ventilating screens or windows is to be recommended. With the slot never entirely closed, the warmer interior air will always flow outward. Incoming cold air will come in through the lower portion of the same slot or openings in the upper portions of the windows just below. The warm air rising from the hens on the roosts at the rear of the pens comes forward to the slot opening. Some goes out and the rest by air friction is drawn down and mixed with the incoming cold air. This makes the recirculation shown in figure 1 of illustration No. 2.

Illustration No. 1. The open front house works well if there is good ground and air drainage.

Illustration No. 4. Good insulation plus careful window adjustments make this house successful.

Smoke Tests Show Air Circulation

Suppose an intake is placed near the floor or half-way up the front wall. See figure 2, illustration No. 2. This will displace the air inside more rapidly but because the intake and outlet are relatively far apart one has but little effect upon the other and there is consequently but little recirculation. A smoke test will reveal this. This type of ventilation is, therefore, less drying in its effect in average winter-time weather and decidedly less comfortable. There are times, however, in warm, foggy, threatening weather spells when the primary consideration may be to increase air movement and to prevent it from becoming too stuffy and warm inside. It is then that the weather-protected low intake and the well-protected outlet slot of the Pennsylvania house shown in circular 115 function very admirably. See illustration No. 3, Pennsylvania plans. From the standpoint of maximum dryness and comfort, however, this intake should be closed most of the time with the shutter provided for the purpose.

For the flues placed, as shown in figure 3, illustration No. 2, again displacement circulation is effected with but little recirculation. Recently the writer had a letter from a poultryman who had four such devices in a 20 by 20 shed-roof house, insulated and heated and very damp. Open front ventilation had also produced the same damp interior conditions in that house.

Winter's Day Arrangements

Figure 4, illustration No. 2 shows an idealistic arrangement of the front of a pen on a cold, windy, winter's day. Practically, this means the middle slot valve open with corresponding centrally located windows or screens lowered somewhat. Illustration No. 4 shows such an adjustment on a house that has been very successful. It has an insulated rear wall, insulated side walls as far forward as the droppings boards go and an insulated rear pitch of the roof. Figure 7 of illustration No. 2 shows the desirable inside horizontal recirculation caused by this adjustment. It is quite evident that any considerable wind greatly modifies the inside heat circulation. This adjustment prevents the wind from causing uncomfortable and undesirable conditions. Figure 5 in illustration No. 2 shows the idealistic adjustment on a still, sunny, winter's day. There is less recirculation but less of this is needed on such days, which many times are exceptionally dry days. Furthermore, care should be taken to prevent the house from becoming too warm in such weather. The free "cod liver oil," direct sunshine, is also valuable.

Adjustments for Foggy Weather

Figure 6 in illustration No. 2 shows the idealistic night-time adjustment for the threatening, foggy, winter weather. The weather-proof upper slot along the entire front should be open. Maximum recirculation is thus produced. In very warm weather the central screens or windows should also be lowered somewhat; or when so equipped a partial or complete opening of the lower slot should be made especially during a rain storm driven by a south wind.

Figure 8 in illustration No. 2 shows another possible adjustment. This may be drying in warm, dry weather. It causes rapid displacement of interior air and may be drafty unless carefully regulated. It gives the wind too much of a chance at the interior making for rapid circulation when it is least needed and causing no more circulation for equal area of openings when most needed in the windless weather.

Pennsylvania House Well-Designed

So far as the writer can determine, the Pennsylvania house illustrated in circular No. 115 is one of the best designed houses it has been his pleasure to see. In the light of more recent findings, the writer should recommend glass substitutes, glass windows, or rather non-ventilating material for the three center sliding curtains. For reasons mentioned it would be recommended also that the lower slot valve be in a closed position most of the time. It is barely possible that the writer might recommend valves, simple six-inch wide boards hinged at the upper edge, for regulation of the upper slot in place of the vertically placed baffle board. An extension of this slot for the entire width of the house would also be recommended to be controlled by three valves.

Over-Restriction of Ventilation Is Bad

Probably the greatest mistake made in the operation of this house, as in the case of the Massachusetts house, is to over-restrict the ventilation of it, if it be non-insulated as it probably usually is. In such a house the center screen should be lowered most of the time from three to 12 inches depending upon the weather. An inside temperature of from 10 to 20 degrees warmer than the outside should be the upper limit. Better than the thermometer readings will be any considerable condensation on roof or wall. If this accumulates from day to day, bad conditions will result. Condensation on a very cold night that disappears during the next day will cause no harm.

Watch Your Birds

It is also to be kept in mind that the actions of the birds make a good guide for proper ventilation adjustments. Clumping up and crowding into corners or under the roost may be due to a drafty condition or its opposite, a dead air condition, associated with a damp chill feeling. Closing up more, especially in mid-afternoon with a declining sun, is the usual procedure for that time of day. Opening the slot more and later the middle screen is the remedy in the morning following a very cold night.

Remodeled Barns Offer Problems

Remodeled barns present a few ventilation problems peculiar to their size. Just as a cube two inches each way has one-half the area per cubic inch of volume as does a cube one inch each way, so a barn is much warmer than a single story house for the same reason. The typical single story house 100 ft. long averages about six square feet of wall and ceiling space per bird. The typical barn averages less than three square feet. The inherent warmth in winter and coolness in summer of the barn and multi-story house are advantages, but several problems are also inherent in the large buildings. In the first place, the warmer interior will cause more condensation on non-insulated walls.

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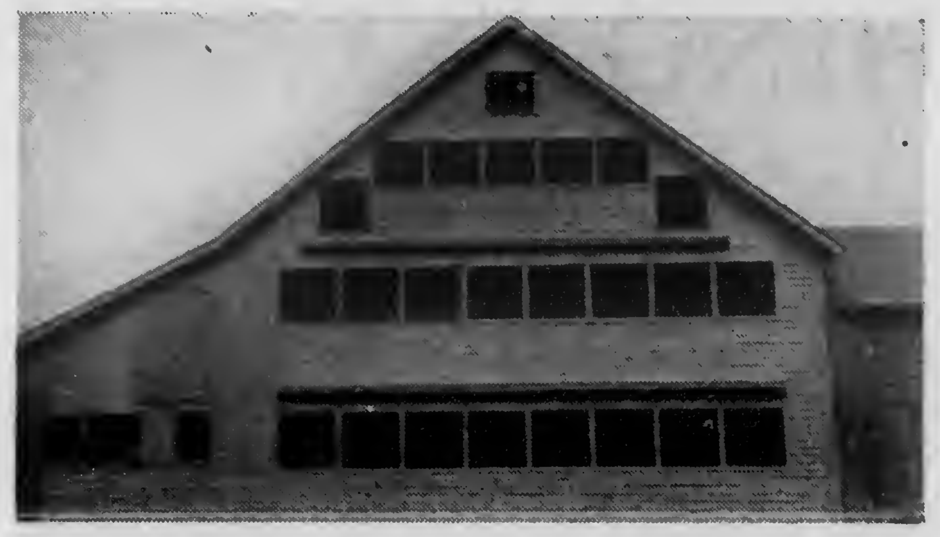

Illustration No. 5. This well insulated barn has given excellent results as a laying house.

To offset this a barn should be insulated or operated on a real open-front basis. See illustration No. 1. Because the area to be insulated is so small, adequate insulation is always to be recommended such as shavings between the studs and rat-proofed by substituting rock wool for shavings at any point where a rat can stand and gnaw through the sheathing.

In the second place, the rear of such barn pens becomes stuffy, particularly on sunny, still forenoons following a cold night. It warms up outside more rapidly than inside and an actual inversion of temperature, colder in than out, may occur for a while. Under such circumstances any ventilation system is upside down and just does not operate efficiently. This does not last long, however, and by mid-afternoon and all through the night normal temperature differentials will have been re-established, probably a bit of wind will have picked up and ventilation is normal again.

Some Barns Are Excellent

Illustration No. 5 shows a barn equipped with single sash windows and regular slots plus a lower drain slot only one-eighth inch wide which latter is not large enough to effect the ventilation. The attic pen is ventilated in winter largely by means of the upper window tipping in at the top. The barn is well insulated. Excellent conditions and results have been obtained in this barn.

If insulation board is used it should be at least one inch thick and placed on the outside of rafters and studs and the siding and roof boards put on over that. This makes no place for the rats and the insulation may be protected from the hens inside with a strip of hen netting tacked to the inner edge of the studs.

Good Insulation Pays

Shavings insulation will practically guarantee a house against freezing of water and the dampening of litter in a properly ventilated and managed house.

A house on posts with double boarding and paper between cannot be kept warm without causing damp litter unless the litter itself provides the insulation. Four inches of sawdust has done this in one house.

In conclusion, it may be said that perfectly satisfactory houses from every standpoint are made so only by the narrowest of margins. Add a few more birds, change to an all-mash ration, have a prolonged spell of unusually bad weather and a house may change from a dry one to a damp one. It is therefore wise to stick to a house and plan of ventilation that has in a given location produced good results.

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CHAPTER III

Careful Attention and Good Feed Needed if You Want More Eggs

By Dr. R. R. Murphy

Poultry Department
Pennsylvania State College

Three requisites of a sound feeding program for laying hens are a complete and well-balanced ration, a workable feeding system and a skilled feeder. All three are essential and of equal importance. A good ration fed by a careless feeder is no better than a poor ration fed by a careful feeder. Satisfactory egg production can not be expected if the ration, the system of feeding or the person doing the feeding is at fault.

Adequacy of the ration and skill or "common sense" in feeding are primary essentials.

Stick to One Good Ration

There are a number of satisfactory rations and methods of feeding laying hens. Apparently there is no best method. Reports indicate that equally good results have been obtained from a number of different types of rations and systems of feeding. From a feeding standpoint, the production of eggs depends not so much upon the particular type of ration or method of feeding used as it does upon the adequacy of the ration and the skill or "common sense" used in feeding it. If a ration fed in a practical manner has produced good results it should be adhered to until one has proven to his own satisfaction that something else is better. To improve or progress changes are essential but too frequently, particularly in poultry feeding, a change is made either in the ration or the method of feeding without a sufficient amount of evidence to prove its worth.

Hand System of Feeding

A common method of feeding layers, which has been in use over a period of years, is what is known as the "hand system." Under this system the hens have access at all times to a dry mash containing approximately 19 per cent protein. A weighed or measured amount of scratch grain is fed once or twice each day. Mash and scratch grain mixtures made from the following ingredients make a satisfactory ration for laying hens. Wholesome ingredients of a good quality should be used.

MASH

350 lbs.	ground yellow corn
150 lbs.	wheat bran
150 lbs.	wheat flour middlings
100 lbs.	ground heavy oats

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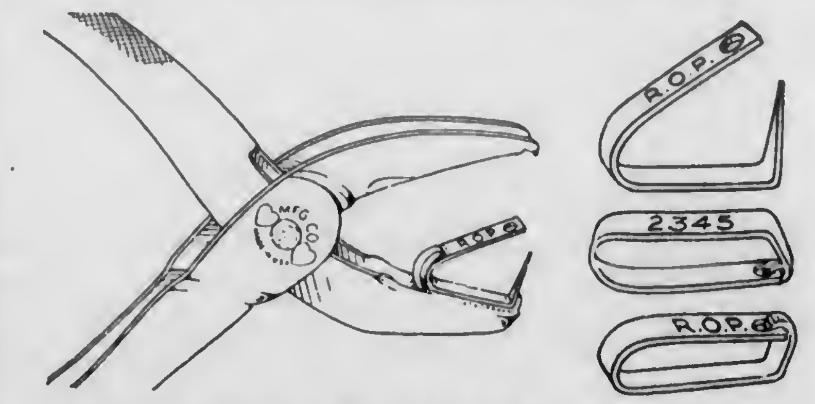
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75 lbs.	alfalfa leaf meal
10 lbs.	ground oyster shell or ground limestone (98 per cent Ca CO3)
20 lbs.	cod liver oil or sardine oil (85 U.S.P. units per gram)
5 lbs.	salt
1035 lbs.	total

SCRATCH GRAIN

400 lbs.	hen size cracked corn
400 lbs.	wheat
200 lbs.	oats
1000 lbs.	total

In order to utilize home grown grains one can use 200 pounds of ground wheat and 100 pounds of wheat bran in place of 150 pounds of bran and 150 pounds of middlings. A part or all of the ground heavy oats may be replaced with ground barley or buckwheat. Such a substitution is desirable if the oats are of a poor quality. In place of 75 pounds of meat scrap and 50 pounds of fish meal 125 pounds of either fish meal or meat scrap may be used. In the scratch grain mixture a part or all of the oats can be replaced with barley or buckwheat. Whole corn may be used in place of all or a part of the cracked corn. Mature birds not accustomed to whole corn may not eat it. To overcome this difficulty it is a good practice to start feeding the whole corn when the pullets are about 12 weeks old. Poultry rations are flexible and may be adjusted to meet existing conditions. However, substitutions or changes that would materially influence the nutritive value of the ration should not be made.

Feeding of Scratch Grain

When scratch grain is fed by hand, a common practice is to feed about three quarters of the daily amount late in the afternoon. The balance can be fed the following morning or at noon either in V-shaped hoppers or scattered in the litter. Scattering the grain in the litter stimulates activity among the birds and aids in keeping the litter dry, particularly during the winter months. During cold weather hens before going to roost should be given all the grain they will consume. Some prefer to give this feeding in hoppers to insure all birds going to roosts with full crops. If the grain is scattered in the litter, enough time should be allowed before darkness to afford sufficient opportunity for the birds to fill their crops.

On the average, 100 laying hens consume 25 pounds of feed a day. The amount varies and depends on the breed, time of year, and rate of production. Under normal conditions about one-half of the feed given should be scratch grain. However, the amount of grain fed may vary from 8 to 16 pounds per 100 birds daily, depending upon conditions. Many feeders find it desirable to feed grain liberally during the winter and sparingly during the summer. It is well to keep in mind that the amount of feed consumed is more important than the exact proportions of grain and mash. For hens to produce they must consume liberal quantities of feed.

Feeding Moist Mash

One method of increasing feed consumption is by feeding a moist mash. Ordinarily, it is fed during the winter when there is a tendency for hens to eat less dry mash and also during the summer when production starts to decrease. It should not be used continuously throughout the year. Laying mash moistened with sufficient water or liquid milk to make it crumbly makes a satisfactory moist mash. Milk in either the dried or condensed form may be used in place of liquid milk. A product equivalent to liquid milk can be obtained by mixing one pound of dried milk or three pounds of condensed milk with one gallon of water. Milk produces a more palatable mash and one of a higher nutritive value.

Feed Moist Mash About Noon

The amount of moist mash to feed is the quantity the hens will readily consume at one feeding. If they leave some in the troughs the amount fed the following day should be decreased. Noon or shortly thereafter seems to be the preferable time for feeding a moist mash. It is important to feed it at the same time each day. If given during the morning a number of hens on the nests are missed. When fed late in the afternoon it interferes with the night feeding of scratch grain. Some have found pellets a satisfactory substitute for moist mash. The use of pellets eliminates the labor involved in mixing a moist mash.

Supplementary Feeds

Succulent feeds such as mangles, cabbages and carrots are relished by hens and add variety to the ration. Carrots contain a considerable amount of vitamin A. To avoid interference with normal mash and grain consumption, the amount of succulent feeds given should be limited. Approximately 5 pounds per 100 hens per day are sufficient. A common way of feeding cabbage and large mangles is to place them on large nails driven through the walls near the floor. This method keeps the feed clean and gives the birds something to pick at in place of one another. When available, small potatoes may be fed to laying hens. They are an economical source of carbohydrates. How-

Satisfactory egg production cannot be expected if the ration, the system of feeding or the person doing the feeding is at fault.

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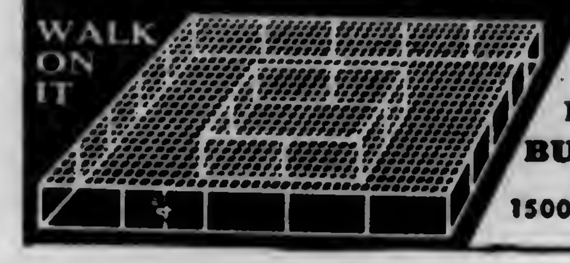

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ever, they should be cooked and fed in limited amounts. A convenient method of feeding is to add the cooked potatoes to the moist mash in about equal proportions. Clover, alfalfa or soybean hay of good quality will supply additional vitamins and help to keep the hens active. The hay can be placed in a wire basket made out of large mesh poultry netting and suspended from the ceiling of the house. Germinated or sprouted oats are excellent succulent feeds. The chief objection to them is the labor required for their preparation. Condensed buttermilk is sometimes used as a supplementary feed. It is very nutritious and the hens like it. A convenient and clean method of feeding is to smear it onto a two inch strip nailed along the walls of the house within reach of the birds. Scratch grain, moist mash and supplementary feeds should be fed at approximately the same time each day. When feeding laying hens, regularity is of prime importance.

Other Good Feeding Practices

For hens to produce well, they must be provided with a sufficient amount of feeding space. One foot of feeding space should be provided for each five birds. This means that for a pen of 100 hens one should have two hoppers five feet long with feeding space on both sides. The hoppers should be so constructed that the mash is visible and also accessible to the birds. Placing the mash hoppers perpendicular to the front wall provides better illumination of the feed. Fresh mash should be placed in the hoppers at frequent intervals. To increase feed consumption, a skillful feeder, not caring for stale food anymore than a hen does, will stir the mash in the hoppers several times each day.

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Provide Plenty of Water

To obtain satisfactory production, an ample supply of fresh clean water is as essential as a plentiful supply of an adequate ration. During cold weather the water should not be allowed to freeze. There are a number of economical devices for maintaining the temperature of the drinking water above freezing that one can either purchase or make at home. If such a device is not used during cold weather fresh water from which the chill has been removed should be placed in the drinking fountains at least twice each day.

Artificial Illumination

A satisfactory means of increasing feed consumption, subsequently egg production during the fall and winter months is the use of artificial illumination. There are various systems of artificial illumination in use, all of which appear to give equally good results. Ordinarily, it is advisable to use the system which is best adapted to the regulatory work of the farm. With pullets, a common practice is to start using lights when a decrease in egg production is first noted. Lights will aid materially in preventing a fall molt occurring among early hatched pullets. Lights may be used on old hens when they are from one-half to two-thirds through their molt. Whether or not it will prove beneficial to use lights before the period of molt will depend on the time at which the hens were hatched. It is not advisable to force hens beyond a 12-months laying period by means of artificial illumination. Birds fed a grain and mash ration should be provided with a 13-hour day. Under the all-mash system of feeding it appears desirable to increase the length of day to 15 hours. No abrupt changes should be made in the length of day provided. It is also important, particularly when the birds are in heavy production, that the lights are used at the regular time each day. The omission of lights even for a short period of time will effect egg production and in some instances throw the birds into a severe molt. The feeding of birds while lights are being used is the same as at other times except possibly scratch grain is fed more liberally. A good ration supplemented with practical feeding practices and plenty of "common sense" will give good results.

Brood With Care

[Continued from page 14]

considered for humans and the larger forms of livestock is entirely impossible. What, then, is to be done?

History is the best prophet of future events. A seven year history of rearing flock mortality based upon "house cleaning" is given in Table I.

Table I. Effect of Cleaning Brooder House.

Year	Per cent mortality Cleaning frequent	Cleaning infrequent (2)	In favor of frequent cleaning
1930	13.02	13.88	.86
1931	10.03	11.12	1.09
1932	11.46	10.21	–1.25
1933	11.26	9.12	–2.14
1934	9.83	7.79	–2.04
1935	8.30	8.31	.01
1936	10.14	8.29	–1.85
1937	9.56	9.01	– .55

(1) The figures are taken from Grow Healthy Pullet Summaries calculated by the Pennsylvania State College Division of Agricultural Extension from farm flock data assembled for a total of several hundred thousand chicks.

(2) Infrequent includes no cleaning.

See the Needs of the Birds

It would seem from the above that frequent house cleaning is of no particular advantage. The purchase of pullorum disease-free chicks, feeding and management to prevent or control caecal coccidiosis, careful range management and the use of partial and total confinement to control parasite infection appear, as far better means to effect low brooding and rearing mortality. The writer does not condone filth and a careless disregard for sanitary conditions in a poultry house. He would simply emphasize again greater attention to the supply and kind of feeding and watering space, placement of feeding equipment perpendicular to light openings, attention to little details of management procedure which may mean the difference between good feathering and cannibalism, even and uneven growth, high and low mortality. If the poultryman will use the time he might spend in useless housecleaning to **see** the needs his chickens and then **supply** these needs as he sees them, he will prosper in proportion.

CHAPTER IV

Market Your Eggs at Better Prices

By James M. Gwin

Poultry Department
University of Maryland

The marketing of Pennsylvania poultry products, presents to the producers of this state a problem which they are successfully solving in a number of different ways.

The range of marketing activity, now in operation in various sections of the state, extends from the simple barter system of exchanging ungraded poultry products for groceries, clothing and other manufactured articles, to the highly specialized cooperative egg and poultry auctions. The many merchandising methods which a Pennsylvania poultryman may use provide him with a choice of wholesale or retail outlets which can move his product as a single unit or combine it with others to open new outlets which attract buyers interested in car-lot quantities.

Change the nesting material as often as is necessary to get clean, high quality eggs.

Study Your Sales Ability

The selection of a marketing plan which is adaptable to an individual producer's needs, depends to a large extent upon his location and his production methods. The retail problem confronting most producers is one of sacrificing to the selling organization time that could otherwise be put on production activity. For this reason, producers who consider retailing projects should carefully appraise their sales ability in relation to their production output and follow the one which in the long run will give the most satisfactory returns.

Retailing of poultry products at the farm provides an outlet that has long been enjoyed by producers living close to their consumers and is now being expanded by the development of better transportation methods. Through the medium of the modern roadside stand many urban consumers can now purchase at the point of production freshly killed native poultry and strictly fresh eggs of a quality which more than compensate for the disadvantage of the cash and carry system and the extra miles of driving that are sometimes required.

Retail Routes Are Popular

The producer who is not suitably located or properly equipped to handle road-side business is limited in his retail activity to the development of retail routes. These routes give the consumer the advantage of receiving the fresh poultry products direct from the producer's farm. The number of routes of this nature which have developed in the larger Pennsylvania cities, indicates the consumer's willingness to pay for this additional quality and service.

Although many retail outlets have been developed by Pennsylvania poultrymen, the bulk of their product still moves to market through wholesale channels. A large portion of this wholesale business is handled by the country egg collector, the commission merchant, the cooperative shipping association and the auctions.

Country Egg Collector's Method

The country egg collector's usual procedure is to call at the farm at regular intervals for eggs or poultry, which he normally purchases for cash at the prevailing country price. His method of disposing of them is usually through wholesale or jobbing channels, whose ever-increasing demands for better eggs have made it necessary for the country collector to give more thought to quality procurement.

The egg wholesale and commission merchants with established outlets in the metropolitan markets handle large quantities of Pennsylvania eggs which are secured through auctions and by direct shipments from individuals and members of cooperative shipping associations. The prices paid by these organizations to the

Gather your eggs often in open baskets if you want to secure the greatest returns.

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START Contentment in Your Flocks, Cull Hens Laying.

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In order to furnish quality products, producers must hold their eggs until marketing in coolers where humidity and temperature are favorable for maintaining freshness.

shipper are usually based on one of the daily New York City market quotations.

The cooperative shipping association, which has been developed to a large extent in Pennsylvania, consists primarily of the banding together of a group of producers who establish a uniform standard for their poultry products. They ship directly from their farms to the distributing agencies located in market centers. The large volume of uniform quality product resulting from this combined effort, provides the association with a bargaining power which enables them to secure substantial market advantages. The recent interest which has been shown in this type of marketing agency indicates that producers who are distantly located from markets are finding, in this type of organization, advantages which merit further investigation.

The eastern egg and poultry auctions which have been of untold help to many Pennsylvania producers, owe a large part of their present day success to the pioneer efforts of Pennsylvania poultry interests. In addition to improving quality and developing new outlets these auctions have substantially raised the price structure of all poultry products. By employing the age-old method of auction selling to quality graded poultry products a merchandising method has been evolved which has proven to be of definite value to producers located in the sections of Pennsylvania best adapted to this type of selling organization.

Quality Production Encouraged

The definite increase in returns which Pennsylvania producers have received during the past few years for better poultry products has encouraged quality production in many sections of the state. Producers have learned by experience that the success of any marketing organization that is expected to yield satisfactory returns over a long period of time must be reinforced by a product of dependable quality. It must be remembered that the advantages offered by any organized marketing program cannot be had until considerable cooperative effort has been expended in perfecting a suitable marketing plan. Following this, producers must continue to furnish a product that will build and hold a quality reputation. In support of this movement, however, producers may look to the Pennsylvania Fresh Egg Law which carries enough legal power to prevent misrepresentation of inferior goods and protects quality markets for quality products.

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Don't let disease rob you of your profits. Clean, airy, sanitary houses are almost as important as good feed. Vacuum Cleaned Premier Peat Litter is the best "air-conditioner" for poultry houses. It insulates against heat and cold and controls humidity. It is sanitary and absorbs odors.

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Poultry Being Improved In Pennsylvania

Pennsylvania has a definite breed improvement program. This program is directed by the Bureau of Markets, of the Pennsylvania Department of Agriculture, offices located in Harrisburg.

The Pennsylvania plan consists of the same general stages as the U. S. Poultry Improvement Plan of the United States Department of Agriculture, but in many phases is more rigid.

Every individual bird owned or under the supervision of the breeders and hatcherymen cooperating under the Pennsylvanian program must be examined by a state poultry inspector. Only birds found free of breed disqualifications and possessing good sound bodies are approved and banded. Only banded birds are used for breeding purposes.

In addition to being individually approved, every bird under the Pennsylvania plan must be blood tested by the state. A licensed veterinarian draws the blood samples and the veterinarians in the state laboratory analyze it. Birds reacting to the test must be removed from the breeding flocks.

The most advanced stage of the program is Record Of Performance, better known as R.O.P. This stage is the trap nest and pedigree breeding stage. To qualify for an R.O.P. certificate, a pullet must lay 200 or more eggs averaging to weigh 24 or more ounces per dozen in the first year of lay.

Renew Your Membership

The Pennsylvania State Poultry Association is your organization; the work it does in securing legislation helpful to the Pennsylvania poultry industry is directly beneficial to you; and in order to continue this valuable service, it needs your wholehearted support. Renew your membership before it lapses. Your secretary-treasurer is H. C. Knandel, State College, Pa.

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CHAPTER V

For a Breeding Flock You Need Special Rules

By D. R. Marble

Poultry Department
Pennsylvania State College

There are many flocks which give satisfactory egg production but when their eggs are placed in the incubator they do not hatch well. The commercial hatcheryman who purchases eggs from many different flocks, is faced constantly with this problem. Good breeding is just as essential for satisfactory hatchability as it is for high egg production or large egg size. The ability to produce a high percentage of top grade chicks is, to a large degree, a genetic factor.

However, high hatchability is more than genetic inheritance because it is influenced directly by nutrition and management. Birds inheriting high hatchability may not give satisfactory results due to faulty nutrition or management. Likewise, the best of feeding and management cannot give good hatching results when the necessary genetic factors are lacking.

Watch Physical Condition

One of the first essentials for a breeding flock is good physical condition. Old birds should have a rest period of several weeks prior to the saving of hatching eggs. Anyone who has attempted to obtain good results from old breeders in late summer after many months of high production will appreciate the problem. Pullet breeders are not given a rest prior to the saving of hatching eggs but they should be in good health and flesh if their eggs are to hatch satisfactorily. As a general rule one can expect the best hatches when egg production is on the increase and the poorest hatching results when the production of the flock is gradually declining.

Rations More Important Than Ever

Many different nutritional factors such as vitamins are essential for good hatchability although their absence or scarcity in the ration might not seriously affect egg production. Milk in some form appears to give better hatches than some of the other kinds of protein supplements. Fish oil in some form for the supplying of vitamin D is essential in a good breeding ration. Direct sunlight, especially during the spring months, may help to increase the hatches because it is one of the many sources of vitamin D. Fresh green feed is thought by many to be essential for good hatches but if the vitamins contained therein are supplied by alfalfa meal and yellow corn the results are usually satisfactory. Flocks or birds to be used for breeding should be supplied the above essentials for several weeks in advance of the hatching season if best results are to be secured.

The suggestions made in the above paragraph do not completely cover the nutritional requirements of breeding flocks. They will serve to emphasize the need for more complete rations for breeding flocks than are often used for the usual laying flock.

Management of the Breeders

Some of the details that might logically come under this heading have been discussed under the paragraphs on physical condition and rations. The important thing to watch from a management standpoint is egg production. Birds forced for high production prior to the hatching season are not satisfactory breeders. The use of artificial illumination on old birds should be restricted to the point where egg production is discouraged prior to the saving of hatching eggs. A small amount of light is often used to hasten the completion of the annual molt but it should not be increased to the point where it is stimulating to egg production until the birds have completed their molt and are in good flesh.

Pullets, which are to be used as a source of hatching eggs, should be managed in such a manner that good egg production is obtained, but any tendency to forcing should be avoided. Well fleshed pullets in good health are not usually injured by average egg production during the fall and winter months. They should not be forced to a high rate of production prior to the hatching season because hatchability is usually poor on eggs saved during a period of declining production. Such a period of declining production cannot be avoided on flocks forced to a high peak in the winter. It is possible to obtain a reasonable level of production throughout the fall and winter in order to capitalize upon the higher egg prices at that time of the year and still obtain good hatchability during the spring months, but any attempt to reach the very peak of production in the fall will be reflected in lower hatches the following spring.

Good breeding must come first. The best of feeding and management cannot give good hatching results when the necessary genetic factors are lacking.

What Characters Are Inherited?

Reproduction of the flock should involve more than simply the production of good quality chicks in a reasonable volume. An 80 per cent hatch of husky chicks can often be obtained, but unless those chicks carry in their germ plasm the desired genes the resulting laying flock will not be profitable. Unfortunately, there is no way of distinguishing germ plasm make-up by looking at a box of chicks. Our present state and federal supervision and certification work has been designed to give to the chick purchaser some measure of protection, especially from this germ plasm angle.

Practically all morphological or anatomical characters are inherited by the offspring. Comb type, plumage color, and closeness of feathering are typical examples of characters which are inherited. The list of such characters is almost endless and many of the details of the inheritance of some of these characters are still unknown. There are many physiological characters such as vigor, rate of feather growth, hatchability, and rate of body growth which are inherited in much the same manner as the morphological characters. To the above list must be added the inheritance of egg production; egg size, shape and color; disease resistance and similar economic characters.

Egg Production a Complex Problem

Our present analysis of egg production indicates that this is not a single factor from the inheritance standpoint. Work at the Massachusetts Station has shown that it can be broken up into at least five separate factors. There are early maturity, intensity or rate of production, broodiness, winter pause and persistency. Hays of the Massachusetts Station has published data showing that at least eight different genes or pairs of inherited characters are responsible for the five factors listed above as making up egg production.

The key-note of any breeding program in practice today must be selection. For most accurate results, this selection must be based on actual facts. This is where Record of Performance work, or trapnesting individually carried out without state supervision comes into the picture. The larger and most successful breeding farms are trapnesting, keeping all sorts of records on various inherited characters and pedigree hatching. The detail involved is endless, but only by such means can definite progress be made in improving our strains of poultry. Selection by physical characters such as pigmentation and molt will go a long distance in our improvement program but finally more accurate knowledge must be obtained if the peak of production and egg quality is to be attained.

A Good Breeding Program

In order that an extensive subject may be covered in the small amount of space allotted the following breeding program is outlined:

1. Use only pure varieties as free from defects and disqualification as possible.
2. Secure foundation stock which has been bred for high egg production, large egg size, standard body weight, and high hatchability.
3. Constitutional vigor and vitality are of major importance. Use old hens for flock replacement stock.
4. Selection should be a continuous process.
    - (a) Select hatching eggs of normal egg shape, uniform color, and not less than two ounces each in weight.
    - (b) Sort baby chicks closely. Vigor and freedom from abnormalities are of major importance.
    - (c) Cull weaklings as soon as they can be detected.
    - (d) Make first selection of future breeding males at broiler age. Save three times the number of mature birds required. Dub comb and wattles if danger of freezing exists.
    - (e) Separate cockerels from pullets and do not overcrowd.
    - (f) Final selection of males should be made at maturity. Use only

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For individual bird treatment a drop applied with the "Cap-Brush" in the feathers two inches below the vent kills body lice. A drop on the back of birds' necks kills head lice.

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the large, vigorous males that are free from defects and disqualifications.

5. Select breeding females in September or October using all culling characters. Eliminate undersized birds or birds of poor type.
6. Give old hens at least six to eight weeks rest.
7. Feed a complete breeding ration.
8. Mate at least two weeks in advance of saving hatching eggs. Use males at the ratio of one to 15-20 females in case of light breeds and one to 12-15 in case of heavy breeds.
9. Gather hatching eggs frequently to avoid chilling or heating. Store in a temperature of 45-55 degrees Fahrenheit. Turn if held over seven days.

Poultry Diseases Kept Under Control

The Bureau of Animal Industry, of the Pennsylvania Department of Agriculture, keeps a close watch on poultry diseases.

Its work with poultry consists chiefly of the control of pullorum disease. This is a disease that is transmitted to baby chicks through infected eggs. Breeders, that are carriers of the disease pass the infection on to chicks. The simplest control is the removal of these carriers, which can be detected through the testing of their blood.

Blood samples are drawn from the poultry flocks by licensed veterinarians and sent directly to the state laboratory in Harrisburg, where they are analyzed. Birds that react to the blood test must be removed from the breeding flocks.

For the control of fowl pox, the Bureau issues permits to poultrymen to use vaccine. As vaccine can be dangerous if not properly used, the Bureau keeps a close watch on the spread of the disease through these permits issued.

Every year thousands of diseased birds are sent to the Laboratory for diagnosis. Many times serious epidemics have been halted through the discovery of the infection and the subsequent measures taken to control it.

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PART III

CHAPTER I

Carefully Select the Site
If You Are Planning a Poultry Farm

By Prof. John Vandervort

Head of Extension Department
Pennsylvania State College

When starting in the poultry business or when increasing the size of the flock on the farm, a carefully outlined plan should be made and followed. A systematic arrangement of buildings will not only reduce the amount of labor necessary in taking care of the flock but will also add to the attractiveness of the farm layout. When contemplating the construction of a new building, one should always keep in mind the possibilities of future expansion on that particular farm. So many times the poultry business has been expanded without thought to the future. This may necessitate costly changes later.

Old Buildings Come in Handy

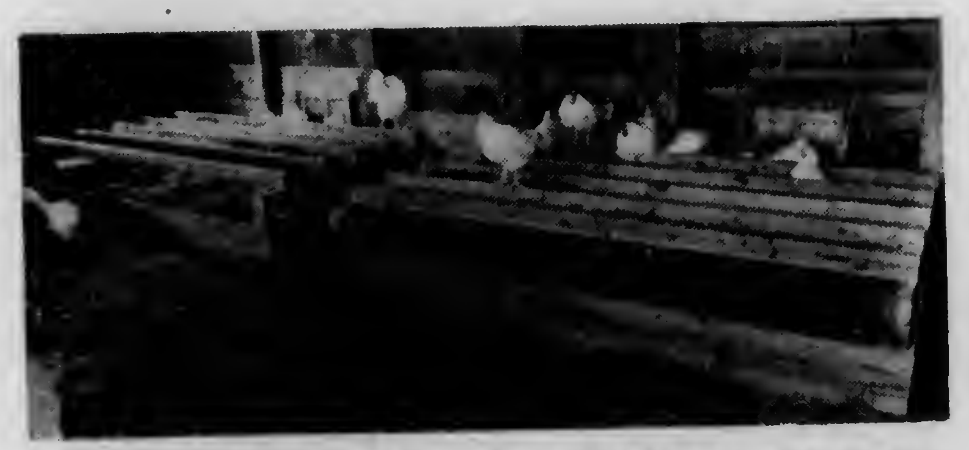
Most individuals who have developed a successful specialized poultry business started in a small way, gradually increasing as they gained experience. The first hen house on many of these farms was a remodeled barn or other building. Before constructing a new house, one should see if it is not possible to use at least a part of a building already on the place for layers. The use of such a building provides an economical way of getting started and keeps investment per bird low. The cost of remodeling is likely to range from twenty-five cents to one dollar per bird depending upon the usable materials available on the farm and the kind of a finished job desired. A common cost of remodeling barns in Pennsylvania has been in the neighborhood of 50 cents per hen. Many of these types of houses have provided more satisfactory housing conditions for poultry than new, more expensive houses.

The first poultry house on many farms was a remodeled barn or other building. This modern three-story laying house, used also for brooding chicks, was converted from a barn at the Harrisburg State Hospital.

Many old barns, such as this, often provide better conditions than new, expensive buildings.

Placing the Windows

In order to take advantage of the maximum amount of sunlight it is customary to place more windows and openings on the south side. However, in some locations strong south winds may make it desirable to open up the east side of the pen. Sometimes the pen must face the north or west. In such cases, one need not give up the idea of using it for layers, though more sunlight will reach the birds in pens facing the south or east. Some windows in the rear of the pen provide a better distribution of light and permit better summer ventilation. Windows on the end may be necessary in deep houses or pens.


Pits are often preferred because they are easier to build and need less cleaning than boards.

New floors and the front construction constitute the major expense in remodeling. The ceiling should be somewhere near seven feet high to provide adequate head room and satisfactory ventilation especially in a deep pen. If one desires to keep costs low he may use a straw loft.

Droppings Pits are Popular

In the accompanying picture the east end of an old barn was remodeled for poultry. The sliding glass windows with slot above provide one satisfactory way to furnish adequate light and ventilation. This arrangement is especially satisfactory in locations where driving winds from the south or east are troublesome. The interior view of the pen shows droppings pits in the place of droppings boards. These are very popular, especially in remodeled buildings. They cost less to construct, provide better ventilation for birds on the roosts and need to be cleaned less often than dropping boards. Then, too, birds do not have to jump so far to get on and off from the roosts. The nests are located on the side walls, easy to reach and not shutting off light.

Poultry Education for Farmers

The Pennsylvania State College is interested not only in the experimental and educational work done right at the College but also maintains a trained corps of poultry experts who carry to every corner of our state poultry knowledge that is of direct benefit to the farmers.

This work is conducted by the Poultry Extension Department of the College in close cooperation with the county agricultural agents. The service consists chiefly of holding community and county meetings at which the extension specialists give general poultry information.

Specialized poultry instruction, including the organization of capon clubs, demonstrations in selecting breeders and conducting disease control programs are given.

Plan to attend the annual Pennsylvania Poultry Tour this August. It will be time well spent.

CHAPTER II

Operating Incubators Is a Scientific Job

By Dr. T. C. Byerly

Poultry Department
University of Maryland

The hatchery business is the most specialized portion of the whole poultry industry. The business has expanded very rapidly since the World War until now probably two-thirds of all chicks hatched in the United States are hatched in hatcheries. Competition has become very keen and with competition has come the necessity for the hatcheryman to improve the quality of his chicks, to reduce the cost of their production, and to increase the services given to his flock owners and customers. The progressive hatcheryman is, of necessity, the key man in poultry improvement work. The chicks he sells must live and grow satisfactorily. The resulting pullets must lay well or the hatcheryman cannot keep his customers and maintain a profitable business. Only the hatcheryman who can keep the same flock owners and the same customers year after year is able to support an adequate improvement program.

Running an incubator is a 24-hour a day job. A competent person must always be within hearing distance of the alarm bell. Putting eggs in and taking chicks out are not all of the work.

Keen Foresight Needed

The hatcheryman must be able to count his chicks before he hatches them. Proper cooperation on the part of his flock owners, stimulated by adequate premiums for high quality hatching eggs, will assist greatly through the guarantee of an adequate supply of eggs of assured high hatchability. Cooperation between flock owner and hatcheryman is the foundation of a successful hatchery.

But it is only the foundation. The hatcheryman can't improve the quality of the eggs after he gets them but his carelessness might destroy their hatching quality. When he pays premiums for high quality eggs, he must get every chick possible from those eggs. He can't tack the whole cost on the selling price of chicks; competition is too keen.

Constant, Careful Watch Necessary

Running an incubator is a 24-hour a day job. A competent person must be within hearing distance of the alarm bell at all times. Eggs hatch a little better if they are turned five to eight times at equal intervals during the 24-hour period during the first 17 days of the incubation period, than when turned but twice. It is unnecessary to turn the eggs during the last three or four days of incubation. This means broken sleep and constant staying at home for the farmer who would do his own hatching—or loss of an incubator full of eggs while the family is out for the evening. It takes almost as much time to operate a 300 egg incubator as a 50,000 egg one, once the eggs are trayed. This adds greatly to the cost of chicks from the small machine.

Exactness Counts

Developing embryos are touchy things. It is necessary to control temperature and moisture quite closely to insure a satisfactory hatch of high quality chicks. Sometimes the thermometer shows a correct temperature (99-100 degrees Fahrenheit for cabinet machines; 102-103 degrees Fahrenheit for sectional machines) but some portion of the incubator may be too hot because the air isn't circulating properly. A fan may slow down below its normal speed; perhaps the incubator door is warped. Running the machine a degree too high will reduce the hatch slightly; it will also damage the chicks that hatch. They will be small, short-downed and weak. Every portion of the incubator should be checked periodically while loaded with incubating eggs to make sure that all parts of the incubator are uniform in temperature.

Too little moisture will also cause the production of small, unthrifty chicks. Newly hatched chicks should weigh about two-thirds as much as the original weight of the eggs from which they hatched. Every 100 chicks should weigh at least eight pounds. This requires a relative humidity of about 60 per cent in the incubator. Humidifying apparatuses become foul with dust and chick down; water pans warp so that subnormal water surface is exposed. These things must be checked.

Sometimes the source of heat fails; current goes off or a lamp or stove goes out. Eggs in the first few days of incubation may be chilled but this is less likely to do damage than failure to remove excess animal heat and carbon dioxide from eggs during the third week of incubation. Room temperature should be kept above 70 degrees Fahrenheit and the incubator doors should be opened or some of the eggs should be removed if the source of heat fails longer than two to three hours during the second half of the incubation period.

Separate Hatchers Often Preferred

Many hatcherymen have found it easier to keep down disease by hatching chicks in a machine other than the one in which the eggs are incubated for the first eighteen days. A little lower temperature and a little higher humidity during the last three days of incubation give a slightly better hatch of heavier chicks with some types of incubators. This increases equipment cost to the hatcheryman, of course.

There's the problem, too, of too many or too few chicks. Suppose a hatcheryman has orders for 10,000—the hatch is poor and he only has 5,000 chicks; his customers don't like it. The individual hatching his own may have a 300-capacity chick brooder ready — only 150 chicks hatch. What can he do? Go out and buy 150 chicks where he can get them without notice?

Suppose the hatcheryman hatches 10,000

[Please turn to page 56]

A WINNING COMBINATION

★ **Good Chicks**
FROM A RELIABLE DEALER

★ **Good Management**
BY YOU

★ **Good Feed**
FROM THE G.L.F.

WELL-BRED chicks, proper care, and G.L.F. Starting & Growing Mash will get your 1938 chick-rearing program off to a flying start. A simple and effective feeding plan is printed on the back of every Starting & Growing Mash tag. The open formula on the front shows exactly what the feed contains.

This formula reflects the latest knowledge of poultry nutritionists, coupled with the experience of thousands of poultrymen, large and small, over a period of fifteen years. It is the product of a cooperative feed service which is owned by its users and exists for their benefit.

Your neighbors are using this cooperative feed service. And 1938 would be a good year for *you* to begin.

COOPERATIVE G. L. F. EXCHANGE, Inc., ITHACA, N. Y.

CHAPTER III

Raise Turkeys for Profits

By P. H. Margolf

Poultry Department
Pennsylvania State College

Probably no poultry market is as responsive to supply and demand as the turkey market. This year at the holiday seasons we have seen it developed from a buyer's to a seller's market. The southwest had sold 75% of their turkey crop for the Thanksgiving market that left the short end of the crop for Christmas. This was the reverse of 1936. However, in 1937 feed prices had been so high an early marketing program looked desirable. This made a seller's market a few days before Christmas, the like of which had not been experienced for several years.

Present Outlook Good

The present outlook on the turkey market spells good prices for 1937 late-hatched poults and how few there are in the country. Who could blame one for not hatching late in 1937? Cold storage holdings of turkeys were estimated at 30,000,000 pounds in late spring and early summer, and feed was high in price. Now with feed prices down the late hatched poults of 1937 will bring the most economical returns.

The short turkey crop of 1937 will have its effect on storage holdings in the spring and summer of 1938. The earlier our turkeys are in shape for market next fall, the more satisfactory will be our returns per pound. This means artificial lights and heat for our breeding stock.

The normal seasonal hatches, plus an abundant supply of feed spell lower prices for the holiday season of 1938. Price is a forward-looking proposition.

Storage Stocks Declining

The turkey is succesfully competing with all other types of meat. This has caused an unusual consumption of turkeys out of season. The storage stocks of turkeys moved out on the market at the rate of five to eight million pounds per month during late summer and early fall of 1937.

Will the turkey continue to compete with other meats? Prices of these are bound to come down, especially pork. As turkeys growers, we are faced with the economics of turkey production.

Turkey Growers Have Many Questions

Vermont turkeys all season have been selling at a premium on the New York

The selection of turkey breeders should be made on a uniformity of characters.

markets. Perhaps the weather is cooler in that section, or, are pullets hatched earlier in the season? What is the well-dressed turkey wearing? Will it take 26 weeks or 32 weeks to mature a turkey?

Will it cost more per pound to produce a small turkey than a large one? Am I justified in holding the turkey a few weeks longer for a better finish and thereby get a few cents more per pound? These and other questions are going through the minds of the turkey growers.

What the well-dressed turkey wears in 1938 depends to a great extent on selection and management of breeding stock; brooding, rearing, and development of the poults; the skill supplied in the methods of preparing them for market; and the method of marketing the finished products.

Keep Turkeys and Chickens Apart

First, last, and always we must keep in mind that turkeys and chickens do not belong together. Turkeys must not range over the same ground with chickens, or where chickens have been or chicken manure has been placed without sufficient time to condition the land by the rotation of crops.

The turkey is a meat bird and selection of breeders should be made on a uniformity of characters. Select for a broad head and beak, prominent eyes, well placed and distributed toes to give a balanced footing; a long straight and well shaped keel covered with a generous amount of flesh. The width between the shoulders should correspond to the depth of the body. If the depth of the body is great, we get a very prominent keel, making it difficult to give the bird a good finish over the breast.

Good Care Important

The care given the breeding flock now will determine the number of fertile eggs hatched and the per cent of good poults.

Turkey eggs can be held for four weeks before setting, provided the storage temperature has been around 55 degrees.

Have the hatching trays comfortably filled with hatchable eggs at the last turning of the eggs. This will prevent many spraddle-legged poults.

In brooding we find about as many methods in use as there are turkey growers. We like to grow our poults in brooder houses until they are eight weeks of age and then turn them out on range for the growing season. January hatched poults would have to be held longer before they go to range. Read Circular 175, "Feeding Growing Turkeys."

Our fields have no shade; therefore we supply it by means of covered roosts. An abundant supply of fresh water is essential to turkey growth on range as well as ample feeding space. I refer you to Circular 148, "Raising Turkeys."

Every turkey grower has his own ideas of how to finish feeding a bird for market. Whatever the method used, we seek a generous supply of fat distributed evenly over the bird.

Appearance Counts Greatly

Furthermore, our product will be justly criticized if we have not prepared it attractively for market. I refer you to Circular 168, "Dressing Poultry on Farms." This will aid us in the preparation of an attractively dressed bird. Remember that appearance opens the customer's pocket book.

Operating Incubators

[Continued from page 53]

and half his customers cancel. He is faced with a surplus chick problem, but he probably has holding batteries and may be able to come out on them as started chicks. The farmer hatches 300 in the middle of a blizzard; he has to put them out because there isn't anything else to do with them.

Consider All the Facts

So you think you can save money by hatching your own chicks? Perhaps you can; but count up the loss of sleep, the labor cost, the expensive incubator you use but twice a year and the chance you take both as to number and quality of chicks.

The man who is equipped mentally and financially to do a real job of breeding usually should hatch and rear chicks from his own flock only. Individual farmers will usually be money ahead to get their chicks from a good local hatchery with a real poultry improvement program. Be cautious if you buy chicks; visit a flock or two selling eggs to the hatchery; find out what your hatcheryman is doing to give you good chicks. Don't immediately conclude that you or somebody a thousand miles away would certainly do better. Would you?

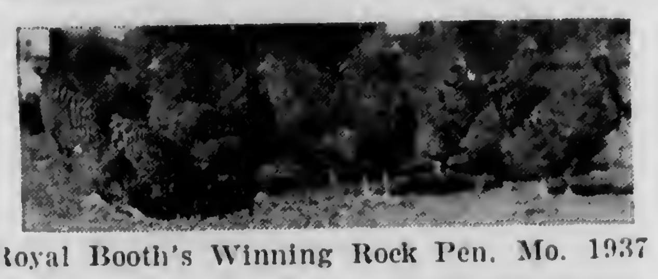
THE POULTRYMEN'S CHOICE

Irving Kauder's Hen-of-the-Year P. I. E. 1937

E. C. Foreman's Winning Pen, West. N. Y. 1937

W. A. Seidel's Winning Pen, Texas 1937

Creighton Bros.' Winning Pen, Hunt., N. J. 1937



Royal Booth's Winning Rock Pen, Mo. 1937

Merwarth Pl. Farm's Winning Pen, Ga. 1937

The remarkable records made in Egg Laying Contests by birds grown on rations which included "STONEMO," the hard insoluble grit, is striking proof of its value in poultry feeding. More U. S. Contest winners are grown on "STONEMO" than any other grit. In 1937 there were ten winning pens that were raised on STONEMO Grit out of a total of 17 U. S. Egg Laying Contests. The 1936 Hen of the Year and the 1937 Hen of the Year were grown on STONEMO Granite Grit.

The biggest production flock between Buffalo and California was raised on and is fed STONEMO. The largest commercial turkey grower in the world uses STONEMO in carlots. These and thousands of other poultrymen would not feed STONEMO Grit year in and year out if it did not pay them well. For the economical raising of broilers STONEMO excels.

Recent experimental work at Cornell Univ. and the U. S. Dept. of Agr., Beltsville, Md. indicates that an excess of calcium is just as detrimental as a shortage.

The calcium intake of a chicken should not exceed 2%. STONEMO Grit used in your feeding plan insures your flock against eating an excess of calcium.

YOUR BIRDS WILL DO BETTER ON
STONEMO
TRY IT ON OUR MONEY BACK GUARANTEE

Sold by leading Feed Dealers everywhere. Place an order today for a trial amount of it. We know you will agree with us that it is the best grit you ever used.

Write for Free Booklets containing endorsements of STONEMO Granite Grit by America's leading poultrymen.

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